

Robotics & Drones Evaluation boards compilation

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Contents: Evaluation boards for Robotics & Drones applications





Motor Control selection





Motor Control selection overview graph





Motor Control selection overview table

Input voltage	Nominal current	Peak / Max. current	Rated / Estd. power	Key Features	Go to Slide
5.5 – 18 V	1 A	1.8 A	~40 W	Typical 12 V BDC motor operation up to 6 motors; Integrated 12 half-bridge mower IC; up to 3 motors by combining 2 half-bridge outputs	Link
5.5 – 18 V	2 A	3.6 A	~40 W	Typical 12 V BDC motor operation up to 6 motors; Integrated 12 half-bridge power IC; 1 motor by combining 4 half-bridge outputs	<u>Link</u>
3.8 – 28 V	7 A	14 A	~80 W	Typical 12 V BDC motor operation; Integrated N+N half-bridge power IC	Link
8 – 18 V	30 A	-	250 W	Typical 12 V BDC motor operation; Integrated P+N half-bridge power IC	Link
12 – 24 V	-	3 A (per phase)	15 W	24 V PMSM motor operation; 6-channel gate driver & dual N-MOSFETs power stage	Link
3.5 – 36 V	2-3 A (per coil)	6 A (per coil)	~100 W	Typical 24 V Stepper DC motor operation; Integrated H-bridge IC	Link
5 V via USB	0.05 A (per phase)	-	~1.5 W	15 V BLDC motor operation; Smart motion control engine (MCE) IC	Link
5.5 – 28 V	1.8 A (per phase)	-	~80 W	Typical 12 V BLDC motor operation; Integrated MCU + 6 N-CH gate driver	Link
24 – 48 V	-	2 A	~100 W	Typical 24 V BLDC motor operation; Possibility to operate PMSM or Stepper motor	Link
8–24 V	30 A	55 A	250 W	Typical 24 V BLDC motor operation; Integrated P+N half-bridge power IC	Link
13 – 48 V	-	10 A (estimated)	250 W	Typical 24 V BLDC motor operation	Link
20 – 45 V	-	12 A	300 W	Typical 24 V BLDC motor operation	Link
12 – 24 V	-	15 A (per phase)	300 W	Typical 18 V BLDC motor operation; Integrated smart 6-channel gate driver + MCU XMC1404	Link
12 – 28 V	-	20 A	~300 W	Typical 12 V BLDC motor operation; Integrated MCU + 6 N-CH gate driver	Link
30 – 72 V	-	6.5 A (per phase)	320 W	Typical 48 V BLDC motor operation	Link
12 – 24 V	-	25 A (per phase)	500 W	Typical 18 V BLDC motor operation; Integrated smart 6-channel gate driver	Link
24 – 40 V	-	75 A (per phase)	1500 W	Typical 36 V BLDC motor operation; Integrated smart 6-channel gate driver	Link
24 – 48 V	-	22 A (per phase)	1500 W	Typical 48 V BLDC motor operation; Integrated 6-channel gate driver	Link
32 – 52 V	-	65 A (per phase)	3000 W	Typical 48 V BLDC motor operation; Integrated half-bridge TDI gate driver; dual-side cooled power stage	Link

BDC Motor Control – TLE94112EL Evaluation (~40 W)



	Technical Details		Overview
ominal input voltage	5.5 V to 18 V		Typical 12 V BDC Motor operation up to 6 motors at 0.5 A load & peak current < 0.9 A
ominal current	1 A (2 half-bridge outputs being paralleled)		Integrated 12-balf-bridge Bower IC
ak current	1.8 A (2 half-bridge outputs being paralleled)		Integrated 12-han-bridge rower to
timated power	ower 40 W		
		>	Motor speed control by PWM at 80 Hz, 100 Hz, and 200 Hz options Control software available in GitHub
		> >	OPN: <u>TLE94112ESSHIELDTOBO1</u> Supply voltage functional range: 5.5 – 18 V
		>	To be used with Arduino Uno R3/XMC1100 Boot Kit (<u>KITXMC11BOOT001TOBO1</u> with on-bo debugger compatible with <u>XMC Link</u>) via SPI and stackable up to 2 shields

Product type	Function	Part number	Description	Package mm x mm	Qty
Gate driver + MOSFETs	Half-bridges provider	TLE94112ES	Protected 12-fold half-bridge driver with PWM generator & supply voltage 5.5 - 18 V & overcurrent threshold at 0.9 A, with Enable function & T_J -40 to 150°C	SSOP24 6x8.65	1
P-MOSFET	Reverse polarity protection	IPD50P04P4L-11	-40 V OptiMOS TM P2 Power Transistor 10.6 mΩ with continuous I _D -50 A at T _C 25°C & V _{GS} -10 V & typ. Q_g 45 nC, AEC qualified	DPAK 6.2x6.5	1
MCU	Control SPI	XMC1100- T038X0064	32-bit Cortex-M0 32/64 MHz C/P clock 16 KB RAM & 64 KB Flash with 12-bit ADC, 2 universal serial interface, $T_{\rm A}$ -40 to 105°C	TSSOP38 9.7x6.4	1
LDO	Voltage regulator	IFX25001MEV33 & IFX25001TFV50	3.3 V & 5 V LDO with up to 400 mA output current limit & reverse polarity protection & V _{IN} 4.7/5.5 V to 40 V – replaceable with <u>TLE42744GSV33</u> & <u>TLE42744DV50</u>	SOT223 & DPAK	1 & 1

BDC Motor Control – TLE94112ES Evaluation (~40 W)



	Technical Details	Overview
Nominal input voltage	5.5 V to 18 V	Typical 12 V BDC Motor operation up to 6 motors at 0.5 A load & peak current <0.9 A
Nominal current Peak current	2 A (4 half-bridge outputs being paralleled)3.6 A (4 half-bridge outputs being paralleled)	 Integrated 12-half-bridge Power IC
Estimated power	40 W	 Possible output current paralleling up to 3.6 A & 1 motor Overcurrent under & over-voltage protections
		 > Overcurrent, under & over-voltage protections > Motor speed control by PWM at 80 Hz, 100 Hz, and 200 Hz options > Control software available in GitHub > I²C-based EEPROM to store HAT configuration > OPN: <u>TLE94112ESRPIHATTOBO1</u> > PCB dimension: 56 x 65 x 25 mm > Supply voltage functional range: 5.5 – 18 V > To be used with Raspberry PI via SPI & stackable for multiple HATs

Product type	Function	Part number	Description	Package mm x mm	Qty	
Gate driver + MOSFETs	Half-bridges provider	TLE94112ES	Protected 12-fold half-bridge driver with PWM generator & supply voltage 5.5 - 18 V & overcurrent threshold at 0.9 A, with Enable function & T_J -40 to 150°C	SSOP24 6x8.65	1	
P-MOSFET	Reverse polarity protection	IPD50P04P4L-11	-40 V OptiMOS [™] P2 Power Transistor 10.6 mΩ with continuous I _D -50 A at T _C 25°C & V _{GS} -10 V & typ. Q _g 45 nC, AEC qualified	DPAK 6.2x6.5	1	
Step-down regulator	Voltage regulator	TLS4125D0EPV50	Up to 2.8 MHz Step-Down Regulator 2.5 A, 5 V \pm 1.5% feedback voltage accuracy in PWM mode, Enable function & V _S 3.7 V to 35 V, to provide 5 V supply for the Raspberry PI board	DSO14 5x6	1	•

BDC Motor Control – BTN7030 Evaluation (~80W)



	Technical Details	Overview
Nominal input voltage	6 V to 18 V	> Typical 12 V BDC Motor operation up to 7 A nominal load
Nominal current 7 A		Integrated N+N half-bridge Power IC
Current limit14 A (at 150°C)		> Overcurrent, under-voltage, over-temperature protections and current sense diagnosis
Estimated power	80 W	 Switching frequency up to 2 kHz
		Control software available in Github & Infineon website OPN: DCSHIEL DRTNZ030TOR01
		 > PCB dimension: 52 x 70 mm > Maximum supply voltage functional range: 3.8 – 28 V
		 To be used with Arduino Uno R3/XMC1100 Boot Kit (<u>KITXMC11BOOT001T0BO1</u> with on-board debugger compatible with <u>XMC Link</u>)

Product type	Function	Part number	Description P		Qty
Gate driver + MOSFETs	Half-bridge IC	BTN7030-1EPA	Protected half-bridge with integrated charge pump & driver, digital signal interface to switch ON the high/low side, Diagnostic Enable pin, supply voltage $3.8 - 28$ V, $R_{DS(on)}$ H/L 25.5 m Ω /36.5 m Ω , nominal load 7 A, overcurrent limit 14 A, overcurrent protection, temperature limit, under-voltage shutdown, T_J -40 to 150°C, automotive qualified	TSDSO14 5x6	2
P-MOSFET	Reverse polarity protection	IPD50P04P4L-11	-40 V OptiMOS TM P2 Power Transistor 10.6 m Ω with continuous I _D -50 A at T _C 25°C & V _{GS} -10V & typ. Q _g 45nC, AEC qualified	DPAK 6.2x6.5	1
MCU	Control SPI	XMC1100- T038X0064	32-bit Cortex-M0 32/64 MHz C/P clock 16 KB RAM & 64 KB Flash with 12-bit ADC, 2 universal serial interface, $T_{\rm A}$ - 40 to 105°C	TSSOP38 9.7x6.4	1
LDO	Voltage regulator	IFX25001MEV33 & IFX25001TFV50	3.3 V & 5 V LDO with up to 400 mA output current limit & reverse polarity protection & V _{IN} 4.7/5.5 V to 40 V – replaceable with <u>TLE42744GSV33</u> & <u>TLE42744DV50</u>	SOT223 & DPAK	1&1

BDC Motor Control – BTN8982 Evaluation (250 W)



	Technical Details	Overview
Nominal input voltage	8 V to 18 V	
Nominal current	30 A average (PCB limitation)	 Typical 12 V BDC Motor operation up to 30 A load
Current limit	55 A	Integrated P+N half-bridge Power IC
Rated power	250 W	Overcurrent & over-temperature protections
		 High PWM frequency e.g. 30 kHz Current sense capability & adjustable slew rate Control software available in GitHub & Infineon website OPN: <u>DCMOTORCONTRBTN8982TOBO1</u> Maximum supply voltage functional range: 6 – 40 V To be used with Arduino Uno R3/XMC1100 Boot Kit (<u>KITXMC11BOOT001TOBO1</u> with on-board debugger compatible with <u>XMC Link</u>)

Product type	Function	Part number	Description	Package mm x mm	Qty
Gate driver + MOSFETs	Half-bridge IC	<u>BTN8982TA</u>	High current P+N half bridge driver with current sense, slew rate adjustment, dead time generation, over- temperature, overcurrent, short circuit, under-voltage protections, $V_s 8 - 18 V$, $T_J -40$ to 150°C, automotive qualified – replaceable with industrial IFX007T	D2PAK7 10x15	2
P-MOSFET	Reverse polarity protection	IPD90P04P4L-04	-40 V OptiMOS [™] P2 Power Transistor 4.3 mΩ with continuous I _D -90 A at T _C 25°C & V _{GS} -10 V & typ. Q _g 135 nC, AEC qualified	DPAK 6.2x6.5	1
MCU	Control SPI	XMC1100- T038X0064	32-bit Cortex-M0 32/64 MHz C/P clock 16 KB RAM & 64 KB Flash with 12-bit ADC, 2 universal serial interface, $T_{\rm A}$ -40 to 105°C	TSSOP38 9.7x6.4	1

PMSM Motor Control – 6EDL04N02PR Evaluation (15 W)



	Technical Details	Overview
Nominal input voltage	12 V to 24 V	> On-board 24 V 15 W PMSM DC motor operation
Nominal current	-	→ 6-channel gate driver & dual N-MOSFETs power stage
Maximum current	3 A	 3 legs shunt current sensing with amplifiers
Notor rated power	15 W	 Control algorithm: Hall-sensored and sensorless back-EMF zero-crossing & FOC
		 High PWM frequency e.g. 20 kHz Overcurrent & under & over-voltage protection
		 Hall sensors & encoder interfaces OPN: <u>KITXMC1XAKMOTOR001TOB01</u> Input voltage range 12 – 24 V Maximum DC-link and motor phase current: 3 A Included XMC1300 Boot Kit with on-board debugger compatible with <u>XMC Link</u>

Product type	Function	Part number	Description	Package mm x mm	Qty
MCU	Control PWM input	XMC1302-T038X0200	Cortex-M0 32-bit 32/64 MHz C/P clock 16 KB SRAM & 128 KB Flash with CCU8 PWM for easy 3-phase inverter implementation & POSIF interface for hall sensors/encoder, T_A -40 to 105°C	TSSOP38 9.7x6.4	1
Gate driver	3-phase gate driver	6EDL04N02PR	200 V 3-Phase gate driver with OCP, Enable, Fault & integrated BSD with 0.165 A & 0.375 A IO source & sink, propagation delay 530 ns	TSSOP28 9.7x6.4	1
N+N dual MOSFET	3-phase power stage	BSZ0907ND	30 V Dual N-Channel OptiMOS [™] MOSFET 9.5/7.2 mΩ with continuous I _D 25/30 A at T _C 70°C, V _{GS} ≥ 10 V & typ. Q _g 4.3/5.3nC – similar replacement <u>BSC0923NDI</u> (5/2.8 mΩ, 40/40 A, 6.7/12 nC)	WISON8 3x3	3

Stepper DC Motor Control – IFX9201SG Evaluation (~100 W)



	Technical Details	Overview
Nominal input voltage	3.5 V to 36 V (typical 24 V)	
Nominal current	2 A per coil	> Typical 24 V Stepper DC Motor operation up to 2 A – 3 A load & peak current 6 A per coll
Current limit	6 A per coil	Integrated H-bridge IC
Estimated power	100 W	Current sensing amplifier each for sine and cosine coils
	STEPPER MOTOR CONTROL SHIELD STEPPER MOTOR CONTROL SHIELD Infineon	 Overcurrent, short circuit, under & over-voltage, over-temperature protections PWM frequency up to 20 kHz Control software available in GitHub for use with Arduino OPN: <u>KITXMC1300IFX9201TOBO1</u> Supply voltage functional range up to 36 V On-board debugger compatible with <u>XMC Link</u> Compatible with Arduino Uno R3/XMC1100 Boot Kit/XMC4700 Relax Kit

Product type	Function	Part number	Description	Package mm x mm	Qty
Gate driver + MOSFETs	H-bridge IC	IFX9201SG	Integrated H-bridge with charge pump, and current & temperature monitor & supply voltage up to 36 V, $\rm T_J$ -40 to 150°C	DSO12 7.8x10.3	2
MCU	Logic control	XMC1302-T038X0200	Cortex-M0 with MATH, 32-bit 32/64 MHz C/P clock 16 KB SRAM & 200 KB Flash with CCU8 PWM for easy 3-phase inverter implementation & POSIF interface for hall sensors/encoder	TSSOP38 9.7x6.4	1

BLDC Motor Control – IMC101T & IPM Evaluation (~1.5 W)



	Technical Details	Overview
Nominal input voltage	5 V via USB socket	\sim 15 V BLDC motor operation with average current 50 mA
Nominal current	50 mA (motor phase current)	Smort motion control engine (MCE) IC
Current limit	-	Smart motion control engine (MCE) IC
Estimated power	1500 mW	Integrated 3-Phase Power Module (IPM)
		Single shunt current sensing
		Control algorithm: sinusoidal and sensorless FOC
	and an Constant	 Power supply from USB
	Martin E 202 60 Jun	 On-board debugger compatible with <u>XMC Link</u> to program the MCE IC
-	Care and	OPN: <u>EVALIMOTION2GOTOBO1</u>
01		 DC bus voltage range: 14 – 16 V (generated on-board)
	and have a good water	> PCB: 62 x 22 mm & 2-layer FR4
-	10 2	> IPM capable of operating BLDC motor up to 95 W without heatsink

Product type	Function	Part number	Description	Package mm x mm	Qty	
Motor control IC	Control PWM input	IMC101T-T038	MCE with integrated scripting engine allowing sensorless operation with FOC for PMSM motor, and space vector PWM with sinusoidal commutation, current sensing via single or leg-shunts, support Hall sensors, DC but input voltage $12 - 400 \text{ V}$, T_J -40 to 115° C, 2 serial ports for device programming & user comm.	TSSOP38 9.7x6.4	1	
Gate driver + MOSFETs	Integrated power module	IRSM836-024MA	250 V integrated gate driver power module with bootstrap functionality, DC output max. 2 A, pulse (100 μ s) output max. 7 A, max. PWM frequency 20 kHz, max. R _{DS(on)} 2.4 Ω at T _J =25°C, V _{CC} =15 V, I _D =1A, T _j -40 to 150°C	PQFN 12x12	1	

BLDC Motor Control – TLE9879QXA40 Evaluation (~80 W)



	Technical Details	Overview
Nominal input voltage	5.5 V to 28 V (typical 12 V)	
Nominal current	1.8 A (motor phase current)	> Typical 12 V BLDC motor operation up to 10 A load
Maximum current	-	Integrated MCU + 6 N-CH Gate Driver
Estimated power	80 W	> To be used with Arduino Uno R3 MCU via SPI
	1111	> Up to 4 boards can be stacked on 1 Arduino Uno
		 Control algorithm: sensorless FOC, BEMF, Hall-based block commutation Protections: over temperature, over current, over voltage, under voltage On-board debugger compatible to <u>XMC Link/SEGGER J-Link</u> OPN: <u>BLDCSHIELDTLE9879TOBO1</u> PCB dimension: 56 x 70 mm

Product type	Function	Part number	Description	Package mm x mm	Qty
MCU + Gate driver	3-phase gate driver	<u>TLE9879QXA40</u>	Cortex-M3 32-bit 40 MHz CPU clock 6 KB RAM & 128 KB Flash with CCU6 for PWM generation, 10-bit ADC, MOSFET driver plus charge pump, LDOs, OpAmp for current sensing via shunt, overtemperature & short circuit protection, LIN transceiver, 5 V supply for external loads, single power supply 5.5 - 27 V, AEC qualified, T _J -40 to 150°C	VQFN48 7x7	1
N-MOSFET	3-phase power stage & reverse polarity protection	<u>IPC90N04S5-</u> <u>3R6</u>	40 V OptiMOS [™] 5 Power Transistor 3.6 m Ω with continuous I _D 90 A at T _C 25°C & V _{GS} 10 V & typ. Q _g 24.5 nC, AEC qualified	TDSON8 5.2x6.5	7

BLDC Motor Control – PSoC[™] 4 Evaluation (~100 W)



	Technical Details		Overview
Nominal input voltage	24 V to 48 V	>	Typical 2 4V 53 W 3.5 A BLDC motor (BLY172S-24 V-4000) operation
Nominal current	minal current -		Simultaneous evaluation for MCU with HMI Capacitive Sensing
Maximum current	2 A	>	Double shunt current sensing & overcurrent protection
Estimated power	100 W	>	Hall sensors interface & back EMF voltage measurement
		>	Control algorithm: Hall-sensored & sensorless Back-EMF & sensorless single & double-shunt FOC
		>	OPN: <u>CY8CKIT-037</u>
		>	To be used with CY8C4245AXI-483 (<u>CY8CKIT-042</u>)/CY8C4548AZI-S485 (<u>CY8CKIT-045S</u>) KIT
			Possibility to operate PMSM and stepper motors

Product type	Function	Part number	Description	Package mm x mm	Qty
N-MOSFET	3-phase power stage	IRFR3607	75 V HEXFET™ Power MOSFET 9 mΩ with continuous I _D 56 A at T _C 25°C & V _{GS} 10 V & typ. Q _g 56 nC	DPAK 6.5x10	6
Gate driver	2-channel gate driver	<u>IR2101S</u>	600 V high side & low side gate driver with UVLO, I_0 source 0.13 A & sink 0.27 A, max. propagation delay 220 ns, gate driver V _S range 10 - 20 V, T _A -40 to 125°C	SOIC8 5x6	3
MCU in KIT 042	Control PWM input	CY8C4245AXI-483	32-bit Cortex-M0 48 MHz CPU clock 4 KB SRAM & 32 KB Flash with 4 TCPWM blocks & Comparator-based triggering of Kill signals for motor drive, 2 OpAmps, CAPSENSE [™] , LCD drive capability on GPIOs, V _S 1.71 – 5.5 V, T _A -40 to 105°C	TQFP44 12x12	1
MCU in KIT 045S	Control PWM input	CY8C4548AZI-S485	32-bit Cortex-M0+ 48 MHz CPU clock 32 KB SRAM & 256 KB Flash with 8 TCPWM blocks & Comparator-based triggering of Kill signals for motor drive, Motor Control Accelerator (MCA) hardware, 4 OpAmps, CAPSENSE™ touch sensing, LCD drive capability on GPIOs, V _S 1.71 – 5.5 V, T _A -40 to 105°C – similar replacement PSoC [™] 4100SPlus/4200M family	TQFP64 16x16	1

BLDC Motor Control – IFX007T Evaluation (250 W)



Technical Details		Overview	
Nominal input voltage	8 V to 24 V (typical 24 V)	Typical 24 V BLDC Motor operation up to 30 A average motor current	
Nominal current	30 A average (PCB limitation)	Integrated PLN balf bridge Power IC	
Current limit	55 A	Integrated F+N hair-bridge Fower IC	
Rated power	250 W	 Vercurrent & over-temperature protections High PWM frequency e.g. 25 kHz 	
		 Current sense capability & adjustable slew rate Github software: Hall-sensored control OPN: <u>BLDCSHIELDIFX007TTOBO1</u> Maximum input voltage: 6 – 40 V To be used with Arduino Uno R3/XMC4700 Boot Kit (<u>KITXMC47RELAX5VADV1TOBO1</u> with onboard debugger compatible with <u>XMC Link</u>) 	

Product type	Function	Part number	Description		Qty
Gate driver + MOSFETs	Half-bridge IC	<u>IFX007T</u>	ligh current P+N half bridge driver with current sense, slew rate adjustment, dead time generation, over- emperature, overcurrent, short circuit, under-voltage protections, V _s 8 - 40 V, T _J -40 to 150°C		3
P-MOSFET	Reverse polarity protection	IPD90P04P4L-04	-40 V OptiMOS [™] P2 Power Transistor 4.3 mΩ with continuous I _D -90 A at T _C 25°C & V _{GS} -10 V & typ. Q _g 135 nC, AEC qualified	DPAK 6.2x6.5	1
MCU	Control SPI	<u>XMC4700-</u> F144K2048	32-bit Cortex-M4 with FPU, 144 MHz CPU clock 352 KB SRAM & 2048 KB Flash with configurable 6 serial channels, CAN interface, Ethernet, USB, memories interfaces, Touch-Sense controller, 2x CCU8 PWM for easy 3-phase inverter implementation & 2x POSIF interface for hall sensors/encoder, T _A -40 to 125°C	LQFP144 22x22	1

BLDC Motor Control – 2EDL05N06PF Evaluation (250 W)



	Technical Details		Overview
lominal input voltage	13 V to 48 V (typical 24 V)		Typical 24 V BLDC (or BDC) motor operation
lominal current	-		Input voltage operating range: 12 48 V
laximum current	10 A (estimated)		2 Phase shunt & DC link surrent detection
Rated power	ated power 250 W		Phase BEMF Voltage measurement
		>	Overcurrent protection with Fault signal to MCU
		>	Sensorless FOC algorithm
		>	OPN: KITMOTORDC250W24VTOBO1
		>	To be used with XMC1300 (<u>KITXMC1300DCV1TOBO1</u>)/XMC1400 Drive Card (<u>KITXMC1400DCV1TOBO1</u>)/XMC4400 Drive Card (<u>KITXMC4400DCV1TOBO1</u>) with on-board debugger compatible with <u>XMC Link</u>

Product type	Function	Part number	Description	Package mm x mm	Qty
N-MOSFET	3-phase power stage	BSC014N06NS	60 V OptiMOS [™] Power Transistor 1.45 mΩ with continuous I _D 240 A at T _C 25 ^o C & V _{GS} 10 V & typ. Q _g 89nC	TDSON8F L 5.2x6.2	6
Gate driver	2-channel gate driver	2EDL05N06PF	600 V high side & low side gate driver with integrated BSD & deadtime & interlock function, I _O source 0.36 A & sink 0.7 A, propagation delay 310 & 300 ns for MOSFET and 420 & 400 ns for IGBT	DSO8 5x6	3
Step-down regulator	Voltage regulator	IFX90121ELV50	2.2 MHz Step-Down Regulator 500 mA, 5 V \pm 2% output voltage tolerance, with Enable function & V _S 4.75 V to 45 V, to provide 5V supply for the MCU board – replaceable with <u>TLF50211EL</u>	SSOP14 4.9x6	1
MCU in KIT board	Control PWM input	<u>XMC1302-</u> <u>T038X0200</u>	32-bit Cortex-M0 with MATH, 32/64 MHz C/P clock 16 KB SRAM & 200 KB Flash with CCU8 PWM for easy 3-phase inverter implementation & POSIF interface for hall sensors/encoder	TSSOP38 9.7x6.4	1

BLDC Motor Control – IMD111T & IPD033N06N Evaluation (300 W)



	Technical Details		Overview
Nominal input voltage	20 V to 45 V (typical 24 V)	>	Typical 24 V BLDC Motor operation
Nominal current	ominal current -		Single-shunt or leg-shunt current sensing configuration on MOSFET board
Maximum current 12 A		>	Control algorithm: Hall sensored/sensorless FOC, Sinusoidal
Rated power 300 W		>	OPN: EVALM7LVMOSINVTOBO1 (MOSFET evaluation board)
		>	PCB dimension: 93 x 80 x 22 mm 2-layer FR4
		>	Switching frequency 20 kHz
			OPN: EVALM7D111TTOBO1 (Motion Control Engine evaluation board)
	Call Martin	>	On-board debugger compatible to XMC Link/SEGGER J-Link

Product type	Function	Part number	Description	Package mm x mm	Qty
N-MOSFET	3-phase power stage	IPD033N06N	60 V OptiMOS [™] Power Transistor 3.3 mΩ with continuous I _D 90 A at T _C 25°C & V _{GS} 10 V & typ. Q _g 38 nC	DPAK 6.5x10	6
LDO	12 V producer	<u>TLF4277-2EL</u>	Adjustable output voltage LDO up to 300 mA with integrated current monitor and extensive protections, input voltage up to 40 V, T_J -40 to 150°C, AEC qualified	SSOP14	1
LDO	5 V producer	TLE42744DV50	5 V LDO ±2% precision up to 400 mA with output & reverse polarity protection & input voltage 5.5 V to 40 V, T_J -40 to 150°C, AEC qualified	DPAK 6.5x10	1
Controller + Gate driver	3-phase motor control	IMD111T-6F040	MCE Smart Driver with integrated high-voltage gate driver & scripting engine allowing sensorless operation with FOC for PMSM motor, and space vector PWM with sinusoidal commutation, current sensing via single or leg-shunts, support Hall sensors, DC bus input voltage $12 - 400$ V, T_A -40 to 105° C, 2 serial ports for device programming & user communication	LQFP40 9x9	1
LDO	3.3 V producer	IFX25001MEV33	3.3 V LDO up to 400 mA with output current limit & reverse polarity protection & input voltage 4.7 V to 40 V – replaceable with <u>TLE42744GSV33</u>	SOT-223	1

BLDC Motor Control – IMD701A Evaluation (300 W)



	Technical Details	Overview
Nominal input voltage	12 V to 24 V (typical 18 V)	> 24 V BLDC motor operation up to 15 A load & switching frequency 20 kHz
Nominal current	-	
Maximum current	15 A rms (per phase)	> Integrated smart 6-channel Gate Driver + MCU XMC1404
Rated power	300 W	 Input voltage operating range: 12 – 24 V
Kaled power 300 W		 Control algorithm: sensorless FOC with 3-shunt I_{sense} Reverse polarity & overcurrent protection & thermal shutdown On-board debugger compatible with <u>XMC Link</u> OPN: <u>EVALIMD700AFOC3SHTOBO1</u> PCB dimension: 76 x 76 mm

Product type	Function	Part number	Description		Qty
MCU + Gate driver	3-phase motor control	<u>IMD701A-</u> <u>Q064X128-AA</u>	Cortex-M0 with MATH, 32-bit 48/96 MHz C/P clock 16 KB SRAM & 128 KB Flash, 2x CCU8 PWM for easy 3- bhase inverter implementation & 2x POSIF interface for hall sensors/encoder, integrated with 3-phase smart gate driver with I_O source / sink 1.5 A, operating supply voltage 5.5 – 60 V, integrated power supplies, & current sense amplifiers, , T_J -40 to 115°C		1
N-MOSFET	3-phase power stage	IQE013N04LM6	40 V OptiMOS [™] 6 Power MOSFET 1.35 mΩ with continuous I _D 205 A at T _C 25°C & V _{GS} 10 V & typ. Q _g 41 nC	TSON8 3.3x3.3	6
LDO	Voltage regulator	IFX54441LDV33	3.3 V LDO 300mA output, 2.5% output voltage accuracy, reverse polarity, overcurrent, over-temperature protection, input voltage 1.8 V to 20 V – replaceable with <u>TLS203B0LDV33</u>	TSON10 3.3x3.3	1
Diode	ESD protection	ESD5V3U2U-03F	Transient voltage suppressor (TVS) diode max. 20 kV ESD, 2 lines unidirectional V_{RWM} 5.3 V	TLSP3	1

BLDC Motor Control – TLE9879QXA40 Evaluation (~300 W)



	Technical Details	Overview	
Nominal input voltage	12 V to 28 V (typical 12 V)	> Typical 12V BLDC Motor operation up to 20 A load	
Nominal current	-	Integrated MCU + 6 N-CH Gate Driver	
Maximum current Estimated power	20 A 300 W	 Included sensors for the included motor: Hall sensors and angle sensor 	
		 > Each-leg shunt current sensing > Control algorithm: Block commutation and FOC in the setting with Hall sensors, angle sensor or sensorless > On-board debugger compatible with <u>XMC Link</u> > OPN: <u>MOTORCONTROLKIT12VTOBO1</u> > PCB dimension: 66 x 110 mm 	

Product type	Function	Part number	Description	Package mm x mm	Qty
MCU + Gate driver	3-phase motor control	<u>TLE9879QXA40</u>	Cortex-M3 32-bit 40 MHz CPU clock 6 KB RAM & 128 KB Flash with CCU6 for PWM generation, 10-bit ADC,IOSFET driver plus charge pump, LDOs, OpAmp for current sensing via shunt, overtemperature & short circuitVCProtection, 5 V supply for external loads, single power supply 5.5 - 27 V, AEC qualified, T _J -40 to 150°C		1
N-MOSFET	3-phase power stage & RPP	IPD90N04S4-05	40 V OptiMOS [™] T2 Power Transistor 5.2 mΩ with continuous I _D 86 A at T _C 25 ^o C & V _{GS} 10 V & typ. Q _g 29 nC, AEC qualified	DPAK 6.2x6.5	7
Hall switch	Position sensor	<u>TLE4968-1L</u>	Bipolar Hall switch with $3 - 32$ V operating V _s , switching thresholds of typical ±1 mT, AEC qualified – similar replacement with TLV4968-1T for consumer application	SSO3 3x4 Through hole	3
Angle sensor	Position – angle sensor	<u>TLE5012B</u> <u>E1000</u>	GMR-based pre-calibrated 360° angle sensor, absolute angle value of 0.01° resolution, max. 1.0° angle error, magnetic field range 30 – 50 mT, PRO-SIL features, SSC interface up to 8Mbps, Incremental Interface, AEC qualified	DSO8 5x6	1

BLDC Motor Control – IMC101T & IRSM005-301 Evaluation (320 W)



	Technical Details		Overview
Nominal input voltage	30 V to 72 V (typical 48 V)	>	Typical 48 V BLDC Motor operation
Nominal current	-	>	Single-shunt current sensing configuration on power stage + gate driver board
Maximum current	6.5 A / phase	>	Control algorithm: Hall sensored/sensorless FOC, Sinusoidal
Rated power	320 W (without heatsink)	>	OPN: EVALM105F310RTOBO1 (power stage + gate driver evaluation board)
x x x x x x x x x x x x x x x x x x x		>	Overcurrent protection leading to PWM shutdown signal
		>	Overheating protection with on-board NTC thermistor
		>	OPN: EVALM1101TTOBO2 (Motion Control Engine evaluation board) of 65 x 45mm
		>	On-board debugger compatible to XMC Link/SEGGER J-Link

Product type	Function	Part number	Description	Package mm x mm	Qty
Intelligent power module	Half-bridge power module	IRSM005-301MH	100 V CIPOS [™] Nano general purpose half-bridge with integrated gate driver, max. 21 mΩ at T _J 25°C & typ. Q_g 36 nC at V_{GS} = 10 V, max. DC current per MOSFET 30 A at T _C 25°C, UVLO, gate drive supply 10 – 20 V, logic input compatible for 3.3 V, 5 V, and 15 V	PQFN 7x8	3
Buck converter	15 V producer	ICE5GR4780AG	ntegrated power IC CoolSET [™] for offline SMPS with integrated 800V CoolMOS [™] of typ. 4.13 Ω R _{DS(on)} , 125 kHz switching frequency, C power supply 10 – 25.5 V, input bus voltage 30 – 600 V		1
Schottky diode	Diode	BAS3005A-02V	30 V Schottky diode with forward current 0.5 A & typ. 0.45 V forward voltage, AEC qualified	SC79	8
Controller	Motor control IC	IMC101T-T038	Motor Control Engine (MCE) ready solution for variable speed drives of single motor, single/leg shunt current sensing, analog/digital Hall sensored & sensorless operation, Encoder interface, FOC algorithm & space vector PWM with sinusoidal commutation, host interface options: UART, PWM, analog input signal, T_A -40 to 105°C, DC bus input voltage 12 – 400 V, digital supply voltage 3 – 5.5 V	TSSOP38 6.4x9.7	1
LDO	Voltage regulator	IFX1117MEV33	3.3 V LDO 1 A output, ±2% precision, short circuit & over-temperature protection, input voltage 4.7 V to 15 V – similar I_{OUT} replacement TLE4284DV33 (different packaging – DPAK)	SOT223	1
Schottky diode	Diode	BAS3010A-03W	30 V Schottky diode with forward current 1 A & typ. 0.41 V forward voltage, AEC qualified	SOD323	1
TVS diode	ESD protection	ESD237-B1-W0201	Bidirectional ESD diode 16 kV, max. working voltage ±8 V, 7 pF line capacitance, clamping voltage 13 V	0201	1

BLDC Motor Control – 6EDL7141 Evaluation (500 W)



	Technical Details	Overview
Nominal input voltage Nominal current Maximum current Rated power	12 V to 24 V (typical 18 V) - 25 A _{RMS} (per phase) 500 W	 Typical 18 V BLDC motor operation up to 25 A load & switching frequency 20kHz Integrated smart 6-channel Gate Driver Input voltage operating range: 12 – 24 V Control algorithm: Hall-sensored trapezoidal with 1-shunt I_{sense}, sensorless FOC with 3-shunt I_{sense} Reverse polarity & overcurrent protection & thermal shutdown On-board debugger compatible with XMC Link OPN: EVAL6EDL7141TRAP1SHTOBO1 for 1-shunt I_{sense} PCB dimension: 76 x 102 mm, 6-layer FR4

Product type	Function	Part number	Description		Qty
Gate driver	6-channel gate driver	6EDL7141	-Phase smart gate driver with I _O source/sink 1.5 A, operating supply voltage 5.5 – 60 V, integrated power supplies, urrent sense amplifiers, Hall sensor comparators, ADC 7		1
MCU	Control PWM input	XMC1404- Q064X0200	ortex-M0 with MATH, 32-bit 48 MHz CPU clock 16 KB SRAM & 200 KB Flash with 12-bit ADC, 2x CCU8 PWM for easy vQF phase inverter implementation & 2x POSIF interface for hall sensors/encoder, T _A -40 to 105°C 8x8		1
N-MOSFET	3-phase power stage	BSC007N04LS6	0 V OptiMOS [™] 6 Power Transistor 0.7 mΩ with continuous I _D 381 A at T _C 25 ^o C & V _{GS} 10 V & typ. Q _g 94nC 5.25		6
LDO	Voltage regulator	IFX54441LDV33	.3 V LDO 300 mA output, 2.5% output voltage accuracy & reverse polarity, overcurrent, over-temperature protection & TSON nput voltage 1.8 V to 20 V – replaceable with <u>TLS203B0LDV33</u> 3.3x3		1
Diode	ESD protection	ESD5V3U2U- 03LRH E6327	Transient voltage suppressor (TVS) diode max. 20 kV ESD, 2 lines unidirectionalV _{RWM} 5.3 V – replaceable with ESD5V3U2U-03F	TLSP3	1

BLDC Motor Control – 6EDL7141 & IST011N06NM5 Evaluation (1500 W)



	Technical Details		Overview
Nominal input voltage	24 V to 40 V (typical 36 V)		
Nominal current	-	>	Typical 36 V BLDC motor operation up to 75 A load & switching frequency 20kHz
Maximum current	75 A _{RMS} (per phase)	>	Integrated smart 6-channel Gate Driver
Rated power	1500 W	>	Input voltage operating range: 24 – 40 V
		> > >	Control algorithm: sensorless FOC with 3-shunt I _{sense} Input fuse & input reverse polarity & overcurrent protection & thermal shutdown On-board debugger compatible with <u>XMC Link</u> Board name: <u>EVAL_6EDL7141_FOC_3SH</u>

Product type	Function	Part number	Description	Package mm x mm	Qty
Gate driver	6-channel gate driver	6EDL7141	3-Phase smart gate driver with I _O source/sink 1.5 A, operating supply voltage 5.5 – 60 V, integrated power supplies, current sense amplifiers, Hall sensor comparators, ADC	VQFN48 7x7	1
MCU	Control PWM input	XMC1404- Q064X0200	Cortex-M0 with MATH, 32-bit 48 MHz CPU clock 16 KB SRAM & 200 KB Flash with 12-bit ADC, 2x CCU8 PWM for easy 3- phase inverter implementation & 2x POSIF interface for hall sensors/encoder, T _A -40 to 105°C	VQFN64 8x8	1
N-MOSFET	3-phase power stage	IST011N06NM5	60 V OptiMOS [™] 5 Power Transistor 1.1 mΩ with continuous I _D 399 A at T _C 25°C & V _{GS} 10 V & typ. Q _g 110 nC	sTOLL 7x8	6

BLDC Motor Control – TLE9140EQW Evaluation (1500 W)



	Technical Details		Overview
Nominal input voltage	24 V to 48 V (typical 48 V)	>	Typical 48 V BLDC motor operation up to 22 A load
Nominal current	- 22 A (average per phase; estimated) 1500 W		Integrated smart 6-channel Gate Driver
Maximum current			Input voltage operating range: $24 - 48$ V
Rated power			Control algorithm: sensorless FOC
12V Dome	Ann 48V Domain Cecco interface Cecco interface	> > > >	On-board 2 supply concepts: isolated 12 V supply & down conversion from 48 V supply to 12 V On-board isolated LIN concept On-board debug interface On-board Hall/angle sensors interface Board name: <u>TLE9140EQW_EVAL</u>

Product type	Function	Part number	Description	Package mm x mm	Qty
MCU + Gate driver	3-phase motor control	<u>TLE9877QXW40</u>	Cortex-M3 32-bit 40 MHz CPU clock 6 KB RAM & 64 KB Flash with CCU6 for PWM generation, 10-bit ADC, MOSFET driver plus charge pump, LDOs, OpAmp for current sensing via shunt, overtemperature & short circuit protection, 5 V supply for external loads, LIN transceiver, single power supply 5.5 - 27 V, AEC qualified, T _J -40 to 175°C	VQFN48 7x7	1
Gate driver IC	3-phase gate driver	TLE9140EQW	3-Phase gate driver, dual charge pump & internal supply, adjustable MOSFET control, functional supply voltage 8 – 60 V, high side voltage 7 – 105 V, 290 nC at 20 kHz driving capability, max. gate current 0.5 A, T _J up to 175°C	DSO32 3.9x8.65	1
N-MOSFET	3-phase power stage	IAUT300N10S5N015	100 V OptiMOS [™] 5 Power Transistor 1.5 mΩ with continuous I _D 300 A at T _C 25°C & V _{GS} 10 V & typ. Q _g 166 nC, TOLL packaging, AEC qualified	HSOF8 9.9x11.7	6
LIN transceiver	LIN transceiver	<u>TLE8457ALE</u>	Single wire LIN transceiver up to 20 kbps, 5 V/3.3 V LDO up to 70 mA capability, under-voltage detection with RESET output, over temperature protection, supply voltage 5.5 – 28 V, T_J -40 to 150°C, AEC qualified	DSO8 / TSON8	1

BLDC Motor Control – 2EDL8124G & IPTC015N10NM5 Evaluation (3000 W)



	Technical Details		Overview
Nominal input voltage	32 V to 52 V (typical 48 V)	>	Typical 48 V BLDC motor operation up to 65 A load
Nominal current	-	>	Integrated half-bridge TDI gate driver IC including bootstrap diode
Maximum current	65 A rms (per phase) 3000 W		Dual-side cooled power stage
Rated power			10 kHz switching frequency & three current shunts
		>	Output over current protection & thermal shutdown
		>	Control algorithm: Trapezoidal/6-step/block commutation with Hall sensors & FOC
		>	OPN: EVALTOLTDC48V3KWTOBO2
		>	To be used with XMC1300 (or above) Drive Card (<u>KITXMC1300DCV1TOBO1</u> with on-board debugger compatible with <u>XMC Link</u>)

Product type	Function	Part number	Description	Package mm x mm	Qty
N-MOSFET	3-phase power stage	IPTC015N10NM5	100 V OptiMOS [™] 5 Power Transistor 1.5 mΩ with continuous I _D 354 A at T _C 25°C & V _{GS} 10 V & typ. Q _g 166 nC, top- side cooling package	HDSOP16 9.9x15	6
Gate driver	Dual channel gate driver	2EDL8124G	120 V high-side & low-side gate driver with true differential input (TDI), integrated bootstrap diode, I _O source 4 A & sink 6 A, shoot-through protection & UVLO, operating frequency up to 1MHz, supply voltage 8 – 17 V	VDSON8 4x4	1
N-MOSFET		IRLML6346TRPBF	30 V HEXFET [™] Power MOSFET 63 mΩ at V _{GS} 4.5 V with continuous I _D 3.4 A at T _C 25°C & V _{GS} 10 V & typ. Q _g 2.9 nC	SOT-23	1
Buck converter	Voltage regulator	ILD8150E	DC-DC buck converter with hysteretic current regulation, output current up to 1.5 A, integrated 80V high-side MOSFET, UVLO & thermal protection, operating voltage 8 – 80 V, T_J -40 to 150°C	DSO8 4.9x6	1
MCU	Control PWM input	XMC1302- T038X0200	Cortex-M0 32-bit 32/64 MHz C/P clock 16 KB SRAM & 128 KB Flash with CCU8 PWM for easy 3-phase inverter implementation & POSIF interface for hall sensors/encoder, T_A -40 to 105°C	TSSOP38 9.7x6.4	1

Environmental & Navigation Sensors selection







Magnetic Sensor Evaluation Board (Current)

- > Analog coreless magnetic current sensor for AC and DC measurement
- > Linear current measurement up to ±120 A
- > Fully calibrated and equipped with internal self-diagnostic feature & EEPROM for user-programmable parameters
- > OPN: TLI4971MS2GOTOBO1 (with XMC1100 board)
- > OPN: <u>S2GOCURSENSETLI4971TOBO1</u> (without XMC1100 board)
- Easy to use with Arduino Uno using the available adapter (<u>MYIOTADAPTERTOBO1</u>) or with XMC1100 S2GO (<u>KITXMC2GOXMC1100V1TOBO1</u>)/XMC1100 Boot Kit (<u>KITXMC11BOOT001TOBO1</u>)
- > Evaluation software for the 2 baseboard types above is available in GitHub & Infineon website
- > On-board debugger compatible with <u>XMC Link</u> for all XMC1100 boards



Product type	Function	Part number	Description	Package mm x mm	Qty
Current sensor	Current sensing	<u>TLI4971-</u> <u>A120T5-</u> <u>E0001</u>	Analog coreless magnetic current sensor, current full scale ±120 A, integrated current rail with typical 120 $\mu\Omega$ insertion resistance, <1 nH parasitic inductance, 240 kHz bandwidth, single-ended or semi or fully-differential output mode, V _{DD} -0.3 – 3.6 V, T _{AS} -40 to 105°C, UL certified device is available	VLGA8 2x2.5	1
MCU	Read sensor output	<u>XMC1100-</u> Q024F0064	32-bit Cortex-M0 32/64 MHz C/P clock 1 6KB RAM & 64 KB Flash with 12-bit ADC, 2 universal serial interface, $\rm T_A$ -40 to 85°C	VQFN24 4x4	1
P-MOSFET	Switches for sensor supply & LED in both shield & MCU boards	BSL308PE	Dual P-channel -30 V OptiMOS [™] P3 Small-Signal Transistor 80 mΩ with continuous I _D -1 A at T _A 120°C & V _{GS} ≤-10 V & typical Q _g 5 nC, automotive qualified	TSOP6 2.5x2.9	2 each board

Magnetic Sensor Evaluation Board (Angle)

Overview

- > 360° digital angle sensor to detect the orientation of a magnetic field with integrated Giant Magneto Resistance (GMR) elements
- > Equipped with XMC1100 MCU to read the sensor output and set the sensor internal registers via Synchronous Serial Communication (SSC) interface
- Possibility to mount mechanical rotation knob with magnet (<u>ROTATEKNOBANGLE2GOTOBO1</u>) to simulate rotational movements for angle measurement
- > On-board debugger compatible with XMC Link
- > Evaluation software available in Infineon website
- > OPN: TLI5012BE1000MS2GOTOBO1/TLE5012BE5000MS2GOTOBO1 for automotive qualified

Product type	Function	Part number	Description	Package mm x mm	Qty
Angle sensor	Angle sensing	TLI5012B E1000	GMR-based pre-calibrated 360° digital angle sensor, absolute angle value of 0.01° resolution, max. 1.9° angle error, magnetic field range $30 - 70$ mT, SSC interface up to 8 Mbps, Incremental Interface, T _J -40 to 125°C	DSO8 5x6	1
Angle sensor	Angle sensing	<u>TLE5012B</u> <u>E5000</u>	GMR-based pre-calibrated 360° digital angle sensor, absolute angle value of 0.01° resolution, max. 1.0° angle error, magnetic field range 30 – 50 mT, PRO-SIL features, SSC interface up to 8 Mbps, PWM, AEC qualified	DSO8 5x6	1
MCU	Read angle & set sensor's registers	XMC1100- Q024F0064	32-bit Cortex-M0 32/64 MHz C/P clock 16 KB RAM & 64 KB Flash with 12-bit ADC, 2 universal serial interface, $\rm T_A$ -40 to 85°C	VQFN24 4x4	1
LDO	Voltage tracker for the sensor	TLE4250-2G	50 mA LDO tracker, short circuit proof, reverse polarity & over-temperature protection, V $_{\rm IN}$ -42 – 45 V, automotive qualified	SCT595 2.5x2.9	1
LDO	Voltage regulator for MCU 3.3 V	<u>IFX54211MB</u> <u>V33</u>	3.3 V linear voltage regulator, ±3% output voltage accuracy, 150 mA output current, V _{IN} 2.7 – 18 V, output current limitation, short circuit protection, over-temperature shutdown, T _J -40 to 125°C – replaceable with automotive qualified <u>TLS202B1MBV33</u>	SCT595 2.5x2.9	1

Magnetic Sensor Evaluation Board (Angle)

- 360° analog angle sensor to detect the orientation of a magnetic field with integrated Tunneling Magneto Resistance (TMR) elements
- Large output signals up to 0.37 V/V enabling direct connection to MCU without any further amplification
- > Low temperature drift reducing external calibration and compensation efforts
- > Equipped with XMC1100 Boot Kit (with on-board debugger compatible with XMC Link)
- > Evaluation software available in Infineon website including calibration procedure
- > Included magnetic knob to demonstrate the sensor functionality
- > OPN: <u>TLE5501EVALKITTOBO1</u>

Product type	Function	Part number	Description	Package mm x mm	Qty
Angle sensor	Angle sensing	<u>TLE5501</u> <u>E0002</u>	TMR-based 360° analog angle sensor, 2 decoupled Wheatstone bridges for redundancy, max. 1.5° angle error, magnetic field range 20 – 100 mT, max. angle speed 1E6 °/sec, ISO26262 compliant requiring separate external safety mechanisms, $V_S 2.7 - 5.5 V$, $T_A -40$ to 150°C, automotive qualified	DSO8 5x6	1
MCU	Read output signals (sin & cos elements)	<u>XMC1100-</u> <u>Q024F0064</u>	32-bit Cortex-M0 32/64 MHz C/P clock 16 KB RAM & 64 KB Flash with 12-bit ADC, 2 universal serial interface, $\rm T_A$ -40 to 105°C	TSSOP38 9.7x6.4	1

Magnetic Sensor Evaluation Board (Angle)

- Combination of analog Giant Magneto Resistance (GMR) sensor covering 360° range & Anisotropic Magneto Resistance (AMR) sensor covering 180° range
- > Dual-die top-bottom configuration in one package enabling high precision angle measurement
- > Internal temperature compensation enabling higher measurement accuracy
- > Pre-amplified output signals for differential or single-ended applications
- > Equipped with XMC4700 MCU to read the sensor output
- > Evaluation software available in Infineon website including calibration procedure
- > Included magnetic knob to demonstrate the sensor functionality
- On-board debugger compatible with <u>XMC Link</u>
- > OPN: <u>TLE5309EVALKITTOBO1</u>

Product type	Function	Part number	Description	Package mm x mm	Qty
Angle sensor	Angle sensing	<u>TLE5309D</u> <u>E1211</u>	Dual-die 3.3 V AMR & GMR analog angle sensor with Temperature Compensation Offset (TCO), magnetic field range 21 – 50 mT at T_A 125°C, max. angle speed 30krpm, max. overall angle error 0.5° on AMR & 0.9° on GMR sensor with auto-calibration, V_S 3 – 3.6 V, T_A -40 to 125°C, automotive qualified	TDSO16 5x6	1
MCU	Read output signals (sin & cos elements)	<u>XMC4700-</u> F100K2048	32-bit Cortex-M4 with FPU, 144 MHz CPU clock, 352 KB SRAM & 2048 KB Flash with configurable 6 serial channels, CAN interface, Ethernet MAC module, USB, MUX 16-bit EBU for external memories, SDMMC, Touch-Sense controller, T_A -40 to 125°C	LQFP100 16x16	1

Magnetic Sensor Evaluation Board (Position)

Overview

- > Simple magnetic sensor for position detection with digital output 0 and 1
- > OPN: <u>S2GOHALLTLE49643MTOBO1</u>
- > Lateral magnetic sensor for direction information (0 and 1 digital output) & speed signal for index counting
- > OPN: <u>S2GO2HALLTLE4966KTOBO1</u>
- > PCB: 38.5 x 14 mm, 2-layer FR4
- Easy to use with Arduino Uno using the available adapter (<u>MYIOTADAPTERTOBO1</u>) or with XMC1100 S2GO (<u>KITXMC2GOXMC1100V1TOBO1</u>)/XMC1100 Boot Kit (<u>KITXMC11BOOT001TOBO1</u>) or with Raspberry PI (<u>S2GO ADAPTER RASP PI</u> <u>IOT</u>)
- > Evaluation software for all 3 baseboard types above is available in GitHub
- > On-board debugger compatible with XMC Link for XMC1100 S2GO/Boot Kit board

Product type	Function	Part number	Description	Package mm x mm	Qty
Hall latch	Position detection	<u>TLE4964-3M</u>	Unipolar Hall switch, 3 – 32 V operating V _S , max. magnetic signal input frequency 10 kHz, typical B _{OP} 12.5 mT & B_{RP} 9.5 mT at T _J 25°C, T _J -40 to 170°C, automotive qualified	SOT23 2.4x2.9	1
Hall latch lateral	Speed and Direction sensing	<u>TLE4966K</u>	Dual bipolar Hall sensor, 2.7 – 24 V operating V _S , direction information & speed signal, max. magnetic signal input frequency 15 kHz, typical B _{OP} 7.5 mT & B _{RP} -7.5 mT at T _J 25°C, T _J -40 to 150°C, automotive qualified – replaceable with <u>TLI4966G</u> for industrial T _J -40 to 125°C	TSOP6 2.6x2.9	1
MCU	Read sensors output	XMC1100- Q024F0064	32-bit Cortex-M0 32/64 MHz C/P clock 16 KB RAM & 64 KB Flash with 12-bit ADC, 2 universal serial interface, $T_{\rm A}$ -40 to $85^{\rm o}{\rm C}$	VQFN24 4x4	1
LDO	Voltage regulator for MCU 3.3 V	<u>IFX54211MB</u> <u>V33</u>	3.3 V linear voltage regulator, ±3% output voltage accuracy, 150 mA output current, V_{IN} 2.7 – 18 V, output current limitation, short circuit protection, over-temperature shutdown, T_J -40 to 125°C – replaceable with automotive qualified <u>TLS202B1MBV33</u>	SCT595 2.5x2.9	1

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Magnetic Sensor Evaluation Board (Position)

- Digital output magnetic sensors covering lateral and vertical sensing for direction information & speed signal for index counting, in addition to 3D magnetic field measurements
- > Equipped with XMC1100 MCU to read the sensors outputs
- Possibility to mount out-of-shaft adapter with ring magnet (<u>OUTOFSHAFTFOR3D2GOTOBO1</u>) to evaluate rotational movements in complete X, Y, and Z-axis
- > On-board debugger compatible with XMC Link
- > Evaluation software available in Infineon website
- > OPN: <u>TLE4966MS2GOTOBO1</u>

Product type	Function	Part number	Description	Package mm x mm	Qty
Hall latch lateral	Speed and Direction sensing	<u>TLE4966G</u>	Dual bipolar Hall sensor, 2.7 – 24 V operating V _S , direction information & speed signal, max. magnetic signal input frequency 15 kHz, typical B _{OP} 7.5 mT & B _{RP} -7.5 mT at T _J 25°C, T _J -40 to 150°C, automotive qualified – replaceable with <u>TLI4966G</u> for industrial T _J -40 to 125°C	TSOP6 2.8x2.9	1
Hall latch vertical	Speed and Direction sensing	TLE4966V-1G	In-plane dual Hall sensor, 3.5 – 32 V operating V _S , direction information & speed signal, max. magnetic signal input frequency 5 kHz, typical B _{OP} 2.5 mT & B _{RP} -2.5 mT at T _J 25°C, T _J -40 to 150°C, automotive qualified	TSOP6 2.8x2.9	1
3D Hall sensor	Magnetic field sensing	<u>TLI493D-</u> <u>W2BW A0</u>	3D Hall sensor, ±160 mT full range magnetic field, 5.5 – 10.5 LSB/mT sensitivity on 12-bit resolution, I ² C interface, 10-bit temperature sensor, V_{DD} 2.8 – 3.5 V, T_{J} -40 to 125°C	WFWLB5 0.93x1.13	1
MCU	Read angle & set sensor's registers	XMC1100- Q024F0064	32-bit Cortex-M0 32/64 MHz C/P clock 16 KB RAM & 64 KB Flash with 12-bit ADC, 2 universal serial interface, T_A -40 to 85°C	VQFN24 4x4	1
LDO	Voltage regulator for MCU 3.3 V	<u>IFX54211MB</u> <u>V33</u>	3.3 V linear voltage regulator, ±3% output voltage accuracy, 150 mA output current, V _{IN} 2.7 – 18 V, output current limitation, short circuit protection, over-temperature shutdown, T_J -40 to 125°C – replaceable with automotive qualified <u>TLS202B1MBV33</u>	SCT595 2.5x2.9	1

Magnetic Sensor Evaluation Board (Position for HMI)

- > Digital 3D magnetic sensor allowing direct measurement of all X, Y, and Z-component of the magnetic field
- > Typical range of ±130 mT magnetic field measurement of all the 3 components
- > Suitable for direction indicator in 3x3 matrix or 5 positions in addition to rotation 360° measurement, and linear position measurement allowing for HMI application
- > OPN: TLV493DA1B6MS2GOTOBO1 (with XMC1100 MCU)
- > OPN: <u>S2GO3DSENSETLV493DTOBO1</u> (without XMC1100 MCU)
- Easy to use with Arduino Uno using the available adapter (<u>MYIOTADAPTERTOBO1</u>) or with XMC1100 S2GO (<u>KITXMC2GOXMC1100V1TOBO1</u>)/XMC1100 Boot Kit (<u>KITXMC11BOOT001TOBO1</u>)
- > Evaluation software available in Github and Infineon website including calibration procedure
- > On-board debugger compatible with XMC Link for all XMC1100 boards
- Mechanical add ons mounted on sensor board: <u>MINICONTROL2GOTOBO1</u> (5 positions + rotation), <u>DIRINDICATOR2GOTOBO1</u> (3x3 direction indicator), <u>POWERDRILL2GOTOBO1</u> (linear position for control trigger)

Product type	Function	Part number	Description	Package mm x mm	Qty
3D Hall sensor	Magnetic field sensing	TLV493D-A1B6	3D magnetic sensor, typical ±130 mT full range magnetic field, typical 10.2 LSB/mT sensitivity on 12-bit resolution, typical update rate of 3.3 kHz, I ² C interface, 12-bit temperature sensor with typical accuracy ±10°C, V_{DD} 2.8 – 3.5 V, T _J -40 to 125°C	TSOP6 2.5x2.9	1
MCU	Read sensor output	XMC1100- Q024F0064	32-bit Cortex-M0 32/64 MHz C/P clock 16 KB RAM & 64 KB Flash with 12-bit ADC, 2 universal serial interface, $\rm T_A$ -40 to 85°C	VQFN24 4x4	1
LDO	Voltage regulator for MCU 3.3 V	IFX54211MB V33	3.3 V linear voltage regulator, ±3% output voltage accuracy, 150 mA output current, V_{IN} 2.7 – 18 V, output current limitation, short circuit protection, over-temperature shutdown, T_J -40 to 125°C – replaceable with automotive qualified <u>TLS202B1MBV33</u>	SCT595 2.5x2.9	1

Magnetic Sensor Evaluation Board (3-axis Position)

- > Digital 3D magnetic sensor allowing direct measurement of all X, Y, and Z-component of the magnetic field
- > Programmable range from extra short range ±50 mT to full range of ±160 mT for all 3 components
- > Typical sensitivity of 7.7 LSB₁₂/mT in full range to 30.8 LSB₁₂/mT in extra short range
- > OPN: <u>S2GO3DTLI493DW2BWA0TOBO1</u>
- > Included ferrite magnet for sensor functionalities evaluation
- > To be used with XMC1100 S2GO (KITXMC2GOXMC1100V1TOBO1) making use of the I²C interface
- > Evaluation software available in Infineon website and Github for Arduino compatible code
- On-board debugger compatible with <u>XMC Link</u>
- > Possible use cases with mechanical add ons mounted on sensor board: out-of-shaft angle measurement, pull trigger, linear movement, rotation knob with push, joystick, tilt angle measurement

Product type	Function	Part number	Description	Package mm x mm	Qty
3D Hall sensor	Magnetic field sensing	<u>TLI493D-W2BW</u> <u>A0</u>	3D magnetic sensor, programmable range and thus sensitivity, ±160 mT full range with typical 7.7 LSB_{12}/mT sensitivity, ±50 mT extra short range with typical 30.8 LSB_{12}/mT sensitivity, I ² C interface of up to 1MHz clock frequency, 12-bit temperature sensor, V_{DD} 2.8 – 3.5V, T_{J} -40 to 125°C	WFWLB5 0.93x1.13	1
MCU	Read sensor output	XMC1100- Q024F0064	32-bit Cortex-M0 32/64 MHz C/P clock 16 KB RAM & 64 KB Flash with 12-bit ADC, 2 universal serial interface, $\rm T_A$ -40 to 85°C	VQFN24 4x4	1
LDO	Voltage regulator for MCU 3.3 V	<u>IFX54211MB</u> <u>V33</u>	3.3 V linear voltage regulator, ±3% output voltage accuracy, 150 mA output current, V _{IN} 2.7 – 18 V, output current limitation, short circuit protection, over-temperature shutdown, T _J -40 to 125°C – replaceable with automotive qualified <u>TLS202B1MBV33</u>	SCT595 2.5x2.9	1

Pressure Sensor Evaluation Board (Air)

- Digital barometric air pressure sensor based on capacitive sensing principle with IPx8 certification (waterproof testing/robustness against water, humidity, and dust)
- > Miniaturized and high precision ±0.002 hPa or ±2 cm
- > 24-bit resolution of pressure and temperature readings
- > OPN: <u>S2GOPRESSUREDPS368TOBO1</u>
- > PCB: 38.5 x 14 mm , 2-layer FR4
- Easy to use with Arduino Uno using the available adapter (<u>MYIOTADAPTERTOBO1</u>) or with XMC1100 S2GO (<u>KITXMC2GOXMC1100V1TOBO1</u>)/XMC1100 Boot Kit (<u>KITXMC11BOOT001TOBO1</u>)
- > Evaluation software for the 2 baseboard types above is available in GitHub
- > On-board debugger compatible with XMC Link for XMC1100 S2GO/Boot Kit board
- > Use cases: height/altitude sensing, air flow control

Product type	Function	Part number	Description	Package mm x mm	Qty
Pressure sensor	Barometric air pressure sensing	<u>DPS368</u>	Digital air pressure sensor, $300 - 1200$ hPa operating pressure range, ±0.002 hPa/±0.02 m precision, ±0.06 hPa/±0.5 m relative accuracy, embedded temperature sensor with ±0.5°C accuracy, 24-bit resolution, I ² C or SPI interface, FIFO memory up to up to 32 pressure or temperature measurements, IPx8 certified, V _{DD} 1.7 – 3.6 V, T _A 0 to 65°C	VLGA8 2x2.5	1
MCU	Read sensor output	XMC1100- Q024F0064	32-bit Cortex-M0 32/64 MHz C/P clock 16 KB RAM & 64 KB Flash with 12-bit ADC, 2 universal serial interface, $T_{\rm A}$ -40 to $85^{\circ}{\rm C}$	VQFN24 4x4	1
LDO	Voltage regulator for MCU 3.3 V	<u>IFX54211MB</u> <u>V33</u>	3.3 V linear voltage regulator, ±3% output voltage accuracy, 150 mA output current, V _{IN} 2.7 – 18 V, output current limitation, short circuit protection, over-temperature shutdown, T_J -40 to 125°C – replaceable with automotive qualified <u>TLS202B1MBV33</u>	SCT595 2.5x2.9	1

Pressure Sensor Evaluation Board (Sound)

- Digital omnidirectional sound pressure sensor based on dual-backplate MEMS technology and capacitance change processed by the integrated ASIC
- > High linearity of the output signal within a dynamic range of 105 dB
- > Pre-calibrated device resulting in sensitivity tolerance within ±1 dB
- > Included audio processing IC converting PDM data stream to PCM audio data
- > OPN: <u>S2GOMEMSMICIM69DTOBO1</u>
- > PCB: 38.5 x 14 mm , 2-layer FR4
- Easy to use with Arduino Uno using the available adapter (<u>MYIOTADAPTERTOBO1</u>) or with XMC1100 S2GO (<u>KITXMC2GOXMC1100V1TOBO1</u>)/XMC1100 Boot Kit (<u>KITXMC11BOOT001TOBO1</u>)
- > Evaluation software for the 2 baseboard types above is available in GitHub
- > On-board debugger compatible with XMC Link for XMC1100 S2GO/Boot Kit board

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Product type	Function	Part number	Description	Package mm x mm	Qty
MEMS Microphone	Right & Left sound sensing	<u>IM69D130</u>	Digital sound sensor, omnidirectional directivity, audio bandwidth 20 Hz – 20 kHz, max. sensitivity -35 dBFS, typical accoustic overload point 130 dBSPL, PDM data output, max. PDM clock frequency 3.3MHz, typical SNR up to 69 dB, typical noise floor -105 dBFS, V_{DD} 1.62 – 3.6 V, T_A 0 to 70°C	3x4	2
MCU	Read sensors output	XMC1100- Q024F0064	32-bit Cortex-M0 32/64MHz C/P clock 16 KB RAM & 64 KB Flash with 12-bit ADC, 2 universal serial interface, T_A - 40 to 85°C	VQFN24 4x4	1
LDO	Voltage regulator for MCU 3.3 V	<u>IFX54211MB</u> <u>V33</u>	3.3 V linear voltage regulator, ±3% output voltage accuracy, 150 mA output current, V_{IN} 2.7 – 18 V, output current limitation, short circuit protection, over-temperature shutdown, T_J -40 to 125°C – replaceable with automotive qualified <u>TLS202B1MBV33</u>	SCT595 2.5x2.9	1

Pressure Sensor Evaluation Board (Air & Sound)

- > Sensors board including Air and Sound Pressure (Microphone) sensors from Infineon
- > Included 9-axis IMU, analog microphone, stereo audio codec with audio jack, and OLED display
- > OPN: <u>CY8CKIT-028-SENSE</u>
- > To be used with PSoC[™] 62 Connectivity Kit (<u>CY8CKIT-062S2-43012</u>) or PSoC[™] 64 Connectivity Kit (<u>CY8CKIT-064B0S2-4343W</u>)
- > Compatible with Arduino Uno connection
- > Evaluation software available in Infineon website (ModusToolbox[™]) specifically targeted for audio and machine learning applications

Product type	Function	Part number	Description	Package mm x mm	Qty
MEMS Microphone	Right & Left sound sensing	<u>IM69D130</u>	Digital sound sensor, omnidirectional directivity, audio bandwidth 20 Hz – 20 kHz, max. sensitivity -35 dBFS, typical accoustic overload point 130 dBSPL, PDM data output, max. PDM clock frequency 3.3 MHz, typical SNR up to 69 dB, typical noise floor -105 dBFS, V_{DD} 1.62 – 3.6 V, T_A 0 to 70°C	3x4	2
Pressure sensor	Air pressure sensing	<u>DPS310</u>	Digital air pressure sensor, $300 - 1200$ hPa operating pressure range, ± 0.002 hPa/ ± 0.02 m precision, ± 0.06 hPa/ ± 0.5 m relative accuracy, embedded temperature sensor with $\pm 0.5^{\circ}$ C accuracy, 24-bit resolution, I ² C or SPI interface, FIFO memory up to up to 32 pressure or temperature measurements, V _{DD} 1.7 – 3.6 V, T _A 0 to 65°C	VLGA8 2x2.5	1
MCU	Sensors interface in PSoC™ 62 Kit	<u>CY8C624ABZI-</u> <u>S2D44</u>	32-bit Cortex-M4F 150 MHz with FPU & MPU & Cortex-M0+ 100 MHz with MPU, 1 MB SRAM & 2 MB application Flash, QuadSPI/Serial memory interface, 13 configurable serial communication blocks, USB-FS, SDHC/eMMC/SD controllers, 2 PDM & I2S audio channels, 32 TCPWM, 12-bit ADC 2Msps, CAPSENSE™ touch sensing, Cryptography accelerator, Secure Boot, V _S 1.7 – 3.6 V, T _A -40 to 85°C	BGA124 9x9	1
MCU	Sensors interface in PSoC™ 64 Kit	<u>CYS0644ABZI-</u> <u>S2D44</u>	32-bit Cortex-M4F 150 MHz with FPU & MPU & Cortex-M0+ 100 MHz with MPU for RoT & secure system function, 1 MB SRAM & 2 MB application Flash, Amazon FreeRTOS (AFR) enabled, HW-based Root of Trust (RoT), Secure Boot support, QuadSPI/Serial memory interface, SDHC interface, USB-FS, 13 configurable serial communication blocks, 2 PDM & I2S audio channels, 32 TCPWM, 12-bit ADC 2 Msps, CAPSENSE™ touch sensing, Cryptography accelerator, V _S 1.7 – 3.6 V, T _A -40 to 85°C	BGA124 9x9	1
Pressure Sensor Evaluation Board (Gas CO₂)



- Digital gas CO₂ sensor based on photoaccoustic spectroscopy (PAS) principle & leveraging on the MEMS sound pressure sensor that detects pressure changes generated by CO₂ molecules in the sensor cavity
- > Direct concentration reading in ppm (part per million) enabled by the integrated MCU
- > OPN: EVALPASCO2MINIBOARDTOBO1
- > To be used with PSoC[™] 6 Wi-Fi Bluetooth[®] Pioneer Kit (<u>CY8CKIT-062-WIFI-BT</u>) or Arduino board
- > OPN: EVALPASCO2SENSOR2GOTOBO1 (for direct interface to USB of PC/Laptop)
- > Evaluation software available in Github and Infineon website







Product type	Function	Part number	Description	Package mm x mm	Qty
CO_2 sensor	CO2 gas sensing	PASCO2V01	Digital gas CO ₂ sensor, concentration range 0 – 32000 ppm, accuracy ± (30 ppm ± 3% tolerance) at 400 – 5000 ppm concentration range, P_{OP} 1013 hPa, I ² C, UART and PWM interfaces, typical digital V_{DD} 3 – 3.6 V, emitter V_{DD} 9.6 – 14.4 V, T_A 0 to 50°C with relative humidity range 0 – 85%	14x14x7.5	1
USB – UART bridge controller	USB – UART converter	<u>CY7C65213-</u> <u>32LTXI</u>	USB to UART bridge, USB2.0 Full Speed 12 Mbps, 1-channel configurable UART up to 3 Mbps, integrated 48 MHz clock oscillator, compatible with USB2 and USB3 host controllers, operating voltage $1.71 - 5.5$ V, T _A -40 to 85° C	QFN32 5x5	1
LDO	Voltage regulator for MCU 3.3 V	<u>TLS202B1MBV3</u> <u>3</u>	3.3 V linear voltage regulator, ±3% output voltage accuracy, 150 mA output current, V_{IN} 2.7 – 18 V, output current limitation, short circuit protection, over-temperature shutdown, T_J -40 to 150°C, automotive qualified	SCT595 2.5x2.9	1
MCU	Read sensor output	<u>CY8C6247BZI-</u> <u>D54</u>	32-bit Cortex-M4F 150MHz with single-cycle multiply, FPU & MPU & Cortex-M0+ 100MHz with single-cycle multiply & MPU, 288kB SRAM & 1MB application Flash, QuadSPI/Serial memory interface, 9 configurable serial communication blocks, 2 PDM & 1 I2S audio channels, 32 TCPWM, 12-bit ADC 1Msps, 2 OpAmps, CAPSENSE TM , Cryptography accelerator, V _S 1.7 – 3.6 V, T _A -40 to 85°C	BGA124 9x9	1

RADAR Sensor Evaluation Board (24 GHz)



- 24 GHz RADAR sensor with 1 Transmitter & 1 Receiver
- > Equipped with 4x1 array antenna for each transmitter & receiver on the radar board
- > Up to 18 m detection range in pulsed mode operation
- > Equipped with Radar baseboard based on XMC4700 MCU for quick evaluation
- > Software Radar Development Kit & GUI available in Infineon Toolbox
- > Possibility to develop radar signal processing algorithms directly on MCU
- > Power supply, USB, or battery based operation on the baseboard
- > Radar current consumption measurement capability on the baseboard
- > SD card on baseboard allowing radar raw data collection and storage
- > On-board debugger compatible with XMC Link
- > OPN: <u>DEMOSENSE2GOLPULSETOBO1</u>: for motion detection & movement direction within user-configurable speed range
- > OPN: <u>DEMODISTANCE2GOLTOBO1</u>: for human motion tracking & range detection, movement direction, proximity & real presence sensing



Product type	Function	Part number	Description	Package mm x mm	Qty
Radar sensor	24 GHz radar transceiver	BGT24LTR11N16	24.05 – 24.25 GHz Si-Ge transceiver MMIC, 1 transmitter & 1 receiver, integrated low phase noise Voltage Controlled Oscillator (VCO), homodyne quadrature receiver, max. output power 10 dBm, max.spurious transmission -20dBm, max. voltage conversion gain 26.5 dB, single V_S 3.3 V, T_A -40 to 85°C	TSNP16 2.4x2.4	1
MCU	Control PWM input & ADC interface	XMC4700-E196K2048	32-bit Cortex-M4 with FPU, 144 MHz CPU clock, 352 KB SRAM & 2048 KB Flash with configurable 6 serial channels, CAN interface, Ethernet MAC module, USB, EBU for external memories, SDMMC, Touch-Sense controller, T_A -40 to 125°C	LFBGA196 12x12	1



RADAR Sensor Evaluation Board (24 GHz)

Overview

- 24 GHz RADAR sensor with 1 Transmitter & 2 Receivers
- Equipped with micro-strip patch antennas with 12 dBi gain and 19 x 76 degrees Field of View (FOV) >
- Fast chirp Frequency Modulated Continuous Wave (FMCW) operation >
- Multiple chirps processing allowing the estimation of 2D range-Doppler map i.e. distance and velocity
- Software Radar Development Kit & GUI available in Infineon Toolbox
- Possibility to develop radar signal processing algorithms directly on MCU >
- On-board debugger compatible with XMC Link
- Use cases for both outdoor and indoor: multiple objects tracking, angle and distance measurement of moving & static targets > within user-configurable range from 1 to 50 m, motion detection, movement direction – approaching or departing
- PCB dimens
- OPN: DEMC

sio <u>P</u>	n: 45 x 50 mm <u>OSITION2GOTOB(</u>	<u>D1</u>			
	Function	Part number	Description	Package mm x mm	Qty
	24 GHz radar transceiver	BGT24MTR12	24 – 24.25 GHz Si-Ge transceiver MMIC, 1 transmitter & 2 receivers, integrated low phase noise Voltage Controlled Oscillator (VCO), on-chip power detector & temperature sensor, homodyne quadrature receiver, max. output power 15 dBm, max. voltage conversion gain 31 dB, single V_S 3.3 V, T_A -40 to 85°C	VQFN32 4.3x5.5	1
	Frequency counter, SPI & ADC interface	<u>XMC4700-</u> E196K2048	32-bit Cortex-M4 with FPU, 144 MHz CPU clock, 352 KB SRAM & 2048 KB Flash with configurable 6 serial channels, CAN interface, Ethernet MAC module, USB, EBU for external memories, SDMMC, Touch-Sense controller, T_A -40 to 125°C	LFBGA196 12x12	1
	Duty-cycle operation	IRLTS2242TRPBF	-20 V HEXFET™ Power MOSFET 32 mΩ at V _{GS} -4.5 V with continuous I _D -3 A at T _A 125°C & V _{GS} -4.5 V & typical Q _α 12 nC	TSOP6 3x3	1



MCU

Product type

Radar sensor

P-MOSFET



RADAR Sensor Evaluation Board (60 GHz)

- 60 GHz RADAR sensor with 1 Transmitter & 1 Receiver and antenna-in-package of 80° FOV enabling design PCB with FR4
- Equipped with Radar baseboard allowing quick evaluation with Radar Development Kit & GUI available in Infineon Toolbox
- > People detection up to 10 m distance with MCU processing, and 7 m distance autonomous
- > Integrated Finite State Machine (FSM) allowing autonomous operation (without MCU)
- > Quad-state inputs for different operation configurations
- > Continuous Wave (CW) Mode or Pulsed Mode operations for autonomous mode
- > For motion detection and movement direction approaching or departing
- > OPN: <u>DEMOBGT60LTR11AIPTOBO1</u>



Product type	Function	Part number	Description	Package mm x mm	Qty
Radar sensor	60 GHz radar transceiver	BGT60LTR11AIP	61 – 61.5 GHz radar sensor, antenna in-package, 1 transmitter & 1 receiver, output power 10 dBm, max.spurious transmission -20 dBm, transceiver antenna gain 6 dBi, ADC, SPI interface, single V_S 1.5 V, $T_{operation}$ -20 to 85°C	UF2BGA42 3.3x6.7	1



RADAR Sensor Evaluation Board (60 GHz)

Overview

- 60 GHz RADAR sensor with 1 Transmitter & 3 Receivers and antenna-in-package enabling design PCB with FR4
- Equipped with Radar baseboard allowing quick evaluation with Radar Development Kit & GUI available in Infineon Toolbox
- > High SNR allowing people detection up to 15 m distance front facing and 10 m distance general
- > Ultra-wide bandwidth resulting in range resolution ~3 cm
- > High sensitivity allowing sub-mm movement detection
- Integrated Finite State Machine (FSM) allowing autonomous operation (without MCU): FMCW frequency sweeps, data acquisition, and samples storing in internal FIFO memory
- > Use cases (with separate processing algorithms): presence/obstacle detection, tracking and segmentation, touchless interaction/gesture recognition, materials differentiation, speed measurement

> OPN: <u>DEMOBGT60TR13CTOBO1</u>



Product type	Function	Part number	Description	Package mm x mm	Qty
Radar sensor	60 GHz radar transceiver	<u>BGT60TR13C</u> <u>E6327</u>	58 – 63.5 GHz radar sensor for FMCW operation, 5.5 GHz bandwidth, antenna in-package, 1 transmitter & 3 receivers, 3 12-bit ADC channels up to 4 Msps, full-duplex FIFO structure, Integrated RF-PLL, timers, counters, and FSM to run set of frames in standalone mode, external 80 MHz clock reference, embedded temperature sensor, SPI interface, single V _S 1.8 V, T _J -40 to 125°C, T _{backside} -20 to 70°C	VF2BGA40 5x6.5	1



3D IR-ToF Imaging Sensor Evaluation Board

3D camera module: flexx2 by pmd and System on Module (SoM) by Emcraft fitted with a camera module by pmd

Overview

> <u>flexx2</u> and <u>Sunny MTP006 SoM</u> use IRS2381C Infineon® REAL3™ 3D Image Sensor

→ <u>Liteon A65 Kit SoM</u> uses IRS1645C Infineon® REAL3[™] 3D Image Sensor

Parameter flexx2		Sunny MTP006	Liteon A65 Kit	Product	Part	Description	
Dimensions (mm)	71.9 x 19.2 x 10.6 mm	18.9 x 18.6 x 5.3 mm	24.7 x 10.7 x 5.8 mm	type	number	Becomption	
3D ToF sensor	IRS2381C REAL3™	IRS2381C REAL3™	IRS1645C REAL3™			224 x 172 pixels with	
Illumination	940 nm 1 Watt VCSEL (LC1)	940 nm 1 Watt VCSEL (LC1)	940 nm 1 Watt VCSEL (LC1)	IR 3D		pixel size, optimized for	
Resolution (pixels)	224 x 172	224 x 172	224 x 172	ToF	IRS2381C	940 nm wavelength, and	
Field of View (H x V)	56° x 44°	60° x 40°	105° x 85°	sensor		reduced power	
Framerate (fps)	Up to 60 (3D frames)	Up to 60 (3D frames)	Up to 60 (3D frames)			consumption applications	
Measurement range	0.1 to 4 m	0.1 to 4 m	0.1 to 3 m			224 x 172 pixels with	
Interfaces	USB3 Type-C	i.MX 8M Mini via 2-lane MIPI- CSI2 and I2C	i.MX 8M Mini via 2-lane MIPI- CSI2 and I2C	IR 3D ToF	IRS1645C	micro-lenses optimized for 850nm wavelength,	
Accuracy	≤ 1% of distance (0.5 – 4 m @ 5 fps), ≤ 2% of distance (0.1 – 1 m @ 45 fps)	≤ 1% of distance (0.5 – 3 m @ 5 fps)	≤ 1% of distance (0.5 – 3 m @ 5 fps)	sensor		cost, & reduced power consumption applications	
SoftwareRoyale SDK C/C++ based supports Matlab, OpenCV, ROS 1, ROS 2OthersDevKit: encased, CE certified, Class 1 Laser product		Linux and binary pmd Royale/Spectre	OpenEmbedded Linux OS running Royale SDK, C/C++ based, ROS 1 support available				
		i.MX 8M Mini Quad, 2 GB LPDDR4, 16 GB eMMC, WiFi/BT	i.MX 8M Mini Quad, 2 GB LPDDR4, 16 GB eMMC, WiFi/BT				

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3D IR-ToF Imaging Sensor Evaluation Board (by BECOM)

Overview

Argos3D and Toreo 3D camera modules by BECOM based on IRS2877A and IRS1125A

> Consumer and Industrial applications with standard and high resolution 3D IR ToF image sensor

Parameter	Argos3D Pulse	Toreo P650	Argos3D P230/P231	Argos3D P330	Product	Part	Description	
Dimensions (mm)	173 x 46 x 65	230 x 148 x 106	173 x 46 x 65	200 x 200 x 62	type	number	Description	
3D ToF sensor	IRS2877A REAL3™	IRS2877A REAL3™	377A REAL3™ IRS1125A REAL3™ IRS1125A REAL3™ OV5640 CMOS RGB				352 x 288 pixels with micro-lenses optimized	
Illumination	2x Active IR 850 nm/940 nm, 8x Laser diodes, 8 W average	850 nm, 16x Laser diodes	850 nm, 8x Laser diodes, 8 W average output	850 nm, 16x Laser diodes	IR 3D ToF sensor	IR 3D ToF sensor	<u>IRS1125A</u>	for both 850 nm & 940 nm wavelengths, and for long range & wide
Resolution (pixels)	640 x 480	640 x 480	352 x 287	352 x 287			automotive qualified	
Field of View (H x V)	80° x 60°	60° x 40°	80° x 60°	80° x 65°/90° x 70°			640 x 480 pixels with	
Framerate (fps)	Up to 40	Up to 30	Up to 40 for 3D data	Up to 40 for 3D data	IR 3D ToF		micro-lenses optimized	
Measurement range	5 m indoor	5 m indoor	3.5 m indoor	10 m indoor/3 m outdoor	sensor	<u>IN32011A</u>	for 940 nm wavelength,	
Interfaces	Gigabit Ethernet, GPIO, trigger in	Gigabit Ethernet, reset, trigger in, 2x output	Ethernet, GPIO, trigger in	Gigabit Ethernet, RS232, RS485, UART, trigger in and out		automotive qualified		
Software frameworks	Matlab, Halcon, MetriCam, LabView	DataSpree DataStudio (DL)	Matlab, Halcon, MetriCam	Matlab, Halcon, MetriCam				
Temperature range & cooling system	-20°C to 45°C with passive cooling	-40°C to 60°C with passive cooling	-20°C to 45°C with passive cooling	0°C to 50°C with passive cooling				
Others	IP 67	IP 67, NVIDIA Tegra TX2 processing module, 2 RGB sensor modules IP 65 & Power over Ethernet for P231 IP 42, Quad core Cortex A9 CPU, dual imaging capability (RGB & 3D IR)						



3D IR-ToF Imaging Sensor Evaluation Board (by Sunny Optical)

	2	Mars and Cleaner 3D camera modules by Sunny Optical based on IRS2381C
Overview		Domestic robots and Consumer applications with low cost 3D IR ToF image sensor
		High resolution module to be integrated into the customer hardware platform

Parameter	Mars01E	Cleaner01A
Dimensions (mm)	72.5 x 48 x 33.5	65 x 48 x 23
3D ToF sensor	IRS2381C REAL3™	IRS2381C REAL3™
Illumination	940 nm VCSEL	850 nm or 940 nm VCSEL
Resolution (pixels)	224 x 172	224 x 10/15/42
Field of View (H x V)	60° x 45°	120° x 8/10/27.5°
Framerate (fps)	Up to 10	Up to 30
Measurement range	0.2 to 2 m	0.2 to 4 m
Interfaces	USB2.0, Ethernet	USB2.0, Rockchip RK11xx processing platform
Software frameworks	Linux Ubuntu, Windows	Windows, Linux, Android
Power consumption	2.3 W average	1.7 W average
Others	Detection accuracy $\leq 1\%$ of distance (0.2 m - 3.2 m)	Detection accuracy $\leq 2\%$ (0.2 m – 1 m @30 fps), global shutter, data output: point cloud, depth & IR map, IMU data

Product type	Part number	Description
IR 3D ToF sensor	<u>IRS2381C</u>	224 x 172 pixels with micro-lenses at 14 µm pixel size, optimized for 940 nm wavelength, and for small size, low cost, & reduced power consumption applications
IR 3D ToF sensor	IRS2877C	640 x 480 pixels with micro-lenses optimized for 940 nm wavelength





Main & HMI Control including Connectivity & Memory selection







Main Control Evaluation Board (120 MHz)

Overview

- > Peripheral-rich ARM Cortex-M4 up to 120 MHz operation
- > OPN: <u>KITXMC45RELAXV1TOBO1</u>
- > PCB dimension: 51 x 98 mm
- > Code generation, compiler and debugger is available via DAVE™ in Infineon website
- > Features: Ethernet 10/100 Mbps transfer rates, micro-SD card interface, qSPI Flash, RTC crystal
- > Software availability in Infineon website for OPTIGA™ Trust X operation



Product type	Function	Part number	Description	Package mm x mm	Qty
MCU	Main MCU & on-board debugger	XMC4500-F100K1024	32-bit Cortex-M4 120 MHz with FPU & MPU, 160 KB SRAM & 1024 KB Flash with configurable 6 serial channels, CAN interface, Ethernet MAC module, USB, EBU for external memories, SDMMC, Touch-Sense controller, T_A -40 to 125°C	LQFP100 22x22	1
Serial Flash	Memory	S25FL032P0XMFI01	32 Mb Quad-SPI Serial Flash 3 V, Quad fast Read 40 MB/sec effective data rate- replaceable with <u>S25FL064LABMFI010</u>	SOIC8 5x8	1
LDO	Voltage regulator	IFX1117MEV33	3.3 V LDO 1 A output, ±2% precision, short circuit & over-temperature protection, input voltage 4.7 V to 15 V – similar I_{OUT} replacement <u>TLE4284DV33</u> (different packaging – DPAK)	SOT223	1

Main Control Evaluation Board (144 MHz)



- > Peripheral-rich ARM Cortex-M4 up to 144 MHz operation
- > OPN: <u>KITXMC47RELAXV1TOBO1</u>
- > PCB dimension: 66 x 98 mm
- > On-board debugger compatible with XMC Link
- > Features: Ethernet 10/100 Mbps transfer rates, CAN transceiver, qSPI 32 Mb Flash (non-IFX device), RTC crystal
- > Posibility to mount OPTIGA™ Trust X/M S2GO board (<u>S2GOSECURITYOPTIGAXTOBO1</u> / <u>S2GOOPTIGAMCLOUDTOBO1</u>) using the available adapter (<u>MYIOTADAPTERTOBO1</u>)
- > FreeRTOS demo code available in Github



Product type	Function	Part number	Description	Package mm x mm	Qty
MCU	Main MCU	XMC4700-F144K2048	32-bit Cortex-M4 144 MHz with FPU & MPU, 352 KB SRAM & 2048 KB Flash with configurable 6 serial channels, CAN interface, Ethernet MAC module, USB, EBU for external memories, SDMMC, Touch-Sense controller, T_A -40 to 125°C	LQFP144 22x22	1
MCU	On-board programmer / debugger	XMC4200-Q48K256	32-bit Cortex-M4 80 MHz with FPU, MPU & flexible CRC engine, 40 kB SRAM & 256 kB Flash, USB, CAN interface up to 1 Mbps, 4 configurable serial interface, 2 12-bit ADC, 2 CCU4, CCU8, POSIF, high resolution PWM, T_A -40 to 125°C	VQFN48 7x7	1
CAN transceiver	CAN transceiver	IFX1051LE	Industrial qualified CAN transceiver up to 1 Mbps transmission rate suitable for 12 & 24 V applications – replaceable with <u>TLE6250G</u> , automotive qualified	DSO8 4x5	1
LDO	Voltage regulator	IFX1117MEV33	3.3 V LDO 1 A output, ±2% precision, short circuit & over-temperature protection, input voltage 4.7 V to 15 V – similar I_{OUT} replacement <u>TLE4284DV33</u> (different packaging – DPAK)	SOT223	1

Main Control Evaluation Board (144 MHz)



Overview

- > Peripheral-rich ARM Cortex-M4 up to 144 MHz operation
- > EtherCAT 100 Mbps slave controller
- > OPN: <u>KITXMC48AUTBASEV2TOBO1</u>
- > PCB dimension: 86 x 103 mm
- > Additional features: security control with ECC & SHA, isolated interface, CAN transceiver, FRAM, RTC crystal, standard Ethernet



Product type	Function	Part number	Description	Package mm x mm	Qty
MCU	Main MCU	<u>XMC4800-</u> <u>E196K2048</u>	32-bit Cortex-M4 144 MHz with FPU & MPU, 352 KB SRAM & 2048 KB Flash with configurable 6 serial channels, CAN & EtherCATSlave interface, Ethernet MAC module, USB, EBU for external memories, SDMMC, Touch-Sense controller, T_A -40 to 125°C	LFBGA196 12x12	1
Security controller	Device authentication	SLS32AIA020A4	OPTIGA [™] Trust-E security controller supporting ECC256 & SHA-256 with up to 3 kB user memory, T _A -25 to 85°C – upgradeable to <u>OPTIGA[™] Trust-M</u> (1-pin-difference)	USON10 3x3	1
Isolated interface	Input isolation	<u>ISO1I813T</u>	24 V isolated 8-channel digital input, with 8-bit parallel/serial interface	TSSOP48 8x12.5	1
Isolated interface	Output isolation	ISO2H823V2.5	24 V isolated 8-channel high-side switch of 0.6 A each with 8-bit parallel/serial interface	VQFN70 12x12	1
CAN transceiver	CAN transceiver	TLE6250GV33	Automotive qualified CAN transceiver up to 1 Mbps transmission rate suitable for 12 & 24 V applications	DSO8 4x5	1
FRAM	Memory	FM25CL64B-G	64 Kb Serial FRAM up to 20 MHz frequency – upgradeable to <u>FM25V02A-G</u> 256 Kb 40 MHz	SOIC8 4x5	1

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Main Control Evaluation Board (350 MHz)



- > Highly peripheral-rich integrated dual core ARM Cortex-M7 up to 350 MHz with FPU and ARM Cortex-M0+ up to 100 MHz
- > Standard and Gigabit Ethernet interface & cryptography engine
- > On-board programmer & debugger compatible with <u>PSoC™ programmer & debugger</u> based on KitProg3 firmware
- > Compatible with Arduino Uno connection
- > OPN: <u>KITXMC72EVKTOBO1</u>
- > Additional features: CAN-FD transceiver, qSPI Flash, expansion card interface M2 connector



Product type	Function	Part number	Description	Package mm x mm	Qty
MCU	Main MCU	<u>XMC7200D-</u> E272K8384AA	32-bit dual Cortex-M7 350 MHz with FPU & MPU & Cortex-M0+ 100 MHz with MPU, 1 MB SRAM & 8 MB code Flash & 256 kB work Flash, cryptography engine, CAN FD, Gigabit Ethernet, external memories & SDHC interface, up to 102 16-bit TCPWM blocks with up to 15 counters for motor control, $V_S 2.7 - 5.5 V$, $T_A -40$ to $125^{\circ}C$	BGA272 16x16	1
MCU	KitProg3 programmer	<u>CY8C5868LTI-</u> LP039	32-bit Cortex-M3 67 MHz with DMA controller & digital filter processor, 64 kB SRAM & 256 kB Flash & 2 kB EEPROM, Full Speed USB 2.0 & Full CAN, 4 TCPWM blocks, configurable 8 - 20-bit ADC, 4 comparators, 4 OpAmps, V_S 1.71 – 5.5 V, T_A -40 to 85°C	QFN68 8x8	1
Serial Flash	Memory	S25FL512SAGMF MR10	512 Mb Quad-SPI Serial NOR Flash 3 V, 133 MHz, uniform 256 kB sectors, Quad read up to 52 MB/s effective data rate, T _A -40 to 125°C, AEC-Q100 grade 1 qualified	SOIC16 10x10	1
CAN FD transceiver	CAN FD transceiver	TLE9251VSJ	Automotive qualified CAN FD transceiver up to 5 Mbps data rate, overtemperature protection, output current limit, digital supply voltage $3 - 5.5 \text{ V}$, T _J -40 to 150°C – replaceable with TLE9251VLE (package TSON8 3x3)	DSO8 5x6	1
Integrated Point of Load (IPOL)	Voltage regulator	IR3883MTRPBF	Continuous 3 A 800 kHz synchronous buck regulator with on-chip PWM controller, overcurrent protection, thermal shutdown, internal soft-start, pre-bias start up	QFN 3x3	2
LDO	Voltage regulator	TLS208D1EJV	Adjustable V _{OUT} 0.8 – 5.25 V, $\pm 2\%$ V _{OUT} accuracy, static I _{OUT} 0.8 A, V _{IN} 2.7 – 18 V, output current limit, overtemperature shutdown, automotive qualified	DSO8 5x6	3

Main & HMI Control & Connectivity Evaluation Board (150 MHz)

infineon

Overview

- Peripheral-rich integrated ARM Cortex-M4F up to 150 MHz with FPU and ARM Cortex-M0+ up to 100 MHz
- Included 2.4 GHz WLAN + Bluetooth[®] & BLE module from Murata (LBEE5KL1DX-883 of size 7 x 5.2 x 1.1 mm) with based on CY4343W & on-board WLAN/BT antenna, and CAPSENSE[™] evaluation components (buttons, 5-segment slider & proximity sensing header)
- > Also included TFT Kit (<u>CY8CKIT-028-TFT</u>) containing 2.4 inch TFT display, 6-axis IMU, ambient light sensor, 32-bit audio codec, and PDM microphone
- > On-board programmer & debugger compatible with PSoC™ programmer & debugger based on KitProg2/3 firmware
- > Evaluation software available in Infineon website (ModusToolbox™ & Amazon FreeRTOS SDK support)
- > Compatible with Arduino Uno R3 connection
- > OPN: CY8CKIT-062-WIFI-BT
- > Additional features: Quad SPI Flash & FRAM, USB-C and Power Delivery

Product type	Function	Part number	Description	Package mm x mm	Qty
MCU	Main MCU	CY8C6247BZI- D54	32-bit Cortex-M4F 150 MHz with FPU & MPU & Cortex-M0+ 100 MHz with MPU, 288 kB SRAM & 1 MB application Flash, QuadSPI/Serial memory interface, 9 configurable serial communication blocks, USB-FS, 2 PDM & 1 I2S audio channels, 32 TCPWM, 12-bit ADC 1 Msps, 2 OpAmps, CAPSENSE™ touch sensing, Cryptography accelerator, Secure Boot, V _S 1.7 – 3.6 V, T _A -40 to 85°C	BGA124 9x9	1
MCU	KitProg2/3 programmer	<u>CY8C5868LTI-</u> LP039	32-bit Cortex-M3 67 MHz with DMA controller & digital filter processor, 64 kB SRAM & 256kB Flash & 2 kB EEPROM, Full Speed USB 2.0 & Full CAN, 4 TCPWM blocks, configurable 8 - 20-bit ADC, 4 comparators, 4 OpAmps, V _S 1.71 – 5.5 V, T _A -40 to 85°C	QFN68 8x8	1
MCU (CCG3)	USB-C PD controller	<u>CYPD3125-</u> <u>40LQXI</u>	Integrated USB-C and Power Delivery (PD) port controller with 32-bit Cortex-M0 48 MHz, 8 kB SRAM & 128 kB Flash, integrated oscillator, 4 configurable serial communication blocks, HW Cryptography block enabling authentication, 20 V-tolerant regulator, T _A -40 to 105°C	QFN40 6x6	1
WLAN & BT IC	WLAN & BT IC in module	<u>CYW4343W</u>	Integrated Single-band 2.4 GHz IEEE 802.11b/g/n with internal power amplifier, LNA, RF T/R switch, Bluetooth [®] 4.1 + EDR with integrated Class-1 PA, concurrent operation, I2S/PCM for BT audio, BLE support, WLAN data rate 1 – 96 Mbps, BT UART up to 4 Mbps	WLBGA74 3x5	1
Serial Flash	Memory	S25FL512SAGB HIA10	512 Mb Quad-SPI Serial NOR Flash 3 V, 133 MHz, uniform 25 6kB sectors, Quad read up to 52 MB/s effective data rate, T _A -40 to 85°C	BGA24 6x8	1
Ferroelectric RAM	Memory	<u>CY15B104QSN-</u> <u>108SXI</u>	4 Mb non-volatile FRAM with endurance of 100 trillion R/W cycles, 151-year data retention, single and multi SPI (quad SPI), up to 108 MHz SDR & 54MHz DDR, V _{DD} 1.8 – 3.6V, T _A -40 to 85°C	SOIC8 5x8	1
High-side Power Switch	CCG3 protection	BTS4175SGA	Smart high-side power switch fitting for 12 V & 24 V applications, V _{OP} 6 – 52 V, R _{DS(on)} 350 mΩ & 1.3 A nominal load current & current limit at 6 A, diagnostic & protection features, T _J -40 to 150°C, AEC qualified	DSO8 5x6	1



(infineon

Main & HMI Control & Connectivity Evaluation Board (150 MHz with RTOS support)

Overview

- > Peripheral-rich integrated ARM Cortex-M4F up to 150MHz with FPU and ARM Cortex-M0+ up to 100 MHz
- Included 2.4 GHz WLAN + Bluetooth[®] module from Murata (LBEE5KL1DX-883 of size 7 x 5.2 x 1.1mm) based on CY4343W & on-board WLAN/BT antenna, and CAPSENSE[™] evaluation components (buttons & 5-segment slider)
- > On-board programmer & debugger compatible with <u>PSoC™ programmer & debugger</u> based on KitProg2/3 firmware
- > Evaluation software available in Infineon website (ModusToolbox[™]) & FreeRTOS demo code available in Github
- > Compatible with Arduino Uno R3 connection
- > OPN: <u>CY8CKIT-064S0S2-4343W</u>
- > Additional features: Quad SPI Flash & FRAM



Product type	Function	Part number	Description	Package mm x mm	Qty
MCU	Main MCU	CYS0644ABZI-S2D44	32-bit Cortex-M4F 150 MHz with FPU & MPU & Cortex-M0+ 100 MHz with MPU for RoT & secure system function, 1MB SRAM & 2MB application Flash, Amazon FreeRTOS (AFR) enabled, HW-based Root of Trust (RoT), Secure Boot support, QuadSPI/Serial memory interface, SDHC interface, USB-FS, 13 configurable serial communication blocks, 2 PDM & I2S audio channels, 32 TCPWM, 12-bit ADC 2 Msps, CAPSENSE [™] touch sensing, Cryptography accelerator, V _S 1.7 – 3.6 V, T _A -40 to 85°C	BGA124 9x9	1
MCU	KitProg2/3 programmer	CY8C5868LTI-LP039	32-bit Cortex-M3 67 MHz with DMA controller & digital filter processor, 64 kB SRAM & 256 kB Flash & 2 kB EEPROM, Full Speed USB 2.0 & Full CAN, 4 TCPWM blocks, configurable 8 - 20-bit ADC, 4 comparators, 4 OpAmps, V_S 1.71 – 5.5 V, T_A -40 to 85°C	QFN68 8x8	1
WLAN & BT IC	WLAN & BT chip in module	<u>CYW4343W</u>	Integrated Single-band 2.4 GHz IEEE 802.11b/g/n with internal power amplifier, LNA, RF T/R switch, Bluetooth [®] 4.1 + EDR with integrated Class-1 PA, concurrent operation, I2S/PCM for BT audio, BLE support, WLAN data rate 1 – 96 Mbps, BT UART up to 4 Mbps	WLBGA74 3x5	1
Serial Flash	Memory	S25FL512SAGBHIA10	512 Mb Quad-SPI Serial NOR Flash 3V, 133 MHz, uniform 256 kB sectors, Quad read up to 52 MB/s effective data rate, T_A -40 to 85°C	BGA24 6x8	1
Ferroelectric RAM	Memory	CY15B104QSN-108SXI	4 Mb non-volatile FRAM with endurance of 100 trillion R/W cycles, 151-year data retention, single and multi SPI (quad SPI), up to 108 MHz SDR & 54 MHz DDR, V_{DD} 1.8 – 3.6 V, T_A -40 to 85°C	SOIC8 5x8	1

Main & HMI Control & Connectivity Evaluation Board (150 MHz)



- Main and HMI control with Bluetooth[®] Low Energy (BLE) connectivity of data rate up to 2 Mbps
- Included E-ink display shield (<u>CY8CKIT-028-EPD</u>) containing 2.7inch monochrome TFT Electrophoretic Display (EPD), 6-axis IMU, PDM microphone, and thermistor
- > Also included CySmart BLE 4.2 USB Dongle (CY5677) with on-board BLE antenna
- → On-board programmer & debugger compatible with PSoC[™] programmer & debugger based on KitProg2/3 firmware
- > Evaluation software available in Infineon website (PSoC[™] Creator)
- > Compatible with Arduino Uno R3 connection
- > OPN: <u>CY8CKIT-062-BLE</u>
- Additional features: CAPSENSE[™] evaluation components (buttons, 5-segment slider & proximity sensing header), NOR Flash, USB-C PD

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Product type	Function	Part number	Description	Package mm x mm	Qty
MCU	Main MCU	CY8C6347BZI-BLD53	32-bit Cortex-M4F 150 MHz with FPU & MPU & Cortex-M0+ 100 MHz with MPU, 288 kB SRAM & 1 MB application Flash, BLE subsystem of 2.4 GHz transceiver & 50 Ω antenna drive & TX power up to 4dBm, QuadSPI/Serial memory interface, 9 configurable serial communication blocks, 2 PDM & 1 I2S audio channels, 32 TCPWM, 12-bit ADC 1 Msps, built-in temperature sensor, 2 OpAmps, CAPSENSE TM touch sensing, ROM-based root of trust via Secure Boot, Cryptography accelerator, V _S 1.7 – 3.6V, T _A -40 to 85°C	BGA116 5.2x6.4	1
MCU	KitProg2/3 programmer	CY8C5868LTI-LP039	32-bit Cortex-M3 67 MHz with DMA controller & digital filter processor, 64 kB SRAM & 256 kB Flash & 2 kB EEPROM, Full Speed USB 2.0 & Full CAN, 4 TCPWM blocks, configurable 8 - 20-bit ADC, 4 comparators, 4 OpAmps, V _S 1.71 – 5.5 V, T _A -40 to 85°C	QFN68 8x8	1
MCU (CCG3)	USB-C PD controller	CYPD3125-40LQXIES	Integrated USB-C and Power Delivery (PD) port controller with 32-bit Cortex-M0 48 MHz, 8 kB SRAM & 128 kB Flash, integrated oscillator, 4 configurable serial communication blocks, HW Cryptography block enabling authentication, 20 V-tolerant regulator, T _A -40 to 105°C	QFN40 6x6	1
High-side Power Switch	CCG3 protection	BTS4175SGA	Smart high-side power switch fitting for 12 V & 24 V applications, V _{OP} 6 – 52 V, R _{DS(on)} 350 mΩ & 1.3 A nominal load current & current limit at 6 A, diagnostic & protection features, T _J -40 to 150°C, AEC qualified	DSO8 5x6	1
Serial Flash	Memory	S25FL512SAGMFI011	512 Mb Quad-SPI Serial NOR Flash 3 V, 133 MHz, uniform 256 kB sectors, Quad read up to 52 MB/s effective data rate, T _A -40 to 85°C	SO16 10.3x10.3	1
Ferroelectric RAM	Memory	FM25V10-G (not soldered)	1 Mb non-volatile FRAM organized as 128 K x 8, endurance of 100 trillion R/W cycles, 151-year data retention, up to 40 MHz frequency fast SPI, direct hardware replacement for serial Flash & EEPROM, V _{DD} 2 – 3.6 V, T _A -40 to 85°C	SOIC8 5x8	1



Connectivity & HMI Evaluation Board (BLE)

- > HMI control via Bluetooth[®] Low Energy (BLE) connectivity of data rate up to 1 Mbps
- Included a baseboard with separate pair of PSoC[™] 4 BLE boards (<u>CY8CKIT-143A</u> & <u>CY5677</u> CySmart BLE 4.2 USB Dongle) each having on-board BLE antenna
- > Battery operation BLE module and USB powered BLE dongle
- > On-board programmer & debugger compatible with <u>PSoC™ programmer & debugger</u> based on KitProg firmware
- > Evaluation software available in Infineon website (PSoC[™] Creator)
- > Compatible with Arduino Uno connection
- > OPN: <u>CY8CKIT-042-BLE-A</u>
- Additional features: FRAM, CAPSENSE[™] evaluation components (buttons, 5-segment slider & proximity sensing header)



Product type	Function	Part number	Description	Package mm x mm	Qty
MCU	BLE MCU	<u>CY8C4248LQI</u> -BL583	32-bit Cortex-M0 with DMA, 48 MHz 32 KB SRAM & 256 KB Flash, BLE 2.4 GHz Radio with 50 Ω antenna drive, RF output power up to 3 dBm, BLE4.2 support, data rate up to 1 Mbps, 4 TCPWM blocks, 4 OpAmps, 12-bit ADC 1 Msps, 2 configurable serial comm. blocks, CAPSENSE™, LCD drive, V _S 1.8 – 5.5 V, T _A -40 to 85°C	QFN56 7x7	1
MCU	KitProg programmer	<u>CY8C5868LTI-</u> <u>LP039</u>	32-bit Cortex-M3 67 MHz with DMA controller & digital filter processor, 64 kB SRAM & 256 kB Flash & 2 kB EEPROM, Full Speed USB 2.0 & Full CAN, 4 TCPWM blocks, configurable 8 – 20-bit ADC, 4 comparators, 4 OpAmps, V_S 1.71 – 5.5 V, T_A -40 to 85°C	QFN68 8x8	1
Ferroelectric RAM	Memory	<u>FM24V10-G</u>	1 Mb organized as 128 K x 8, I ² C interface up to 3.4 MHz, direct hardware replacement for serial I ² C EEPROM, V_{DD} 2 – 3.6 V, T_A -40 to 85°C	SOIC8 5x8	1

Connectivity & HMI Evaluation Board (Wireless LAN & Bluetooth®)

- > Dual band Wi-Fi 5 (802.11ac) up to 433 Mbps & Bluetooth[®] 5.2 compliant up to 3 Mbps connectivity in addition to HMI control
- Included radio module Wi-Fi 5 + Bluetooth[®] 5.2 from Laird Connectivity (Sterling[™]-LWB5+ M.2 of size 30 x 22 x 2.9 mm) with antenna connectors, M.2 interface connection & based on CYW4373E
- > Included also CAPSENSE[™] evaluation components (buttons & 5-segment slider)
- Evaluation software available in Infineon website (ModusToolbox[™])
- > On-board programmer & debugger compatible with <u>PSoC™ programmer & debugger</u> based on KitProg3 firmware
- > Headers compatible with Arduino Uno R3 for hardware expansion using Arduino shields
- > OPN: <u>CY8CEVAL-062S2</u>
- > Additional features: Serial NOR Flash, F-RAM, and OPTIGA™ Trust-M security controller





Product type	Function	Part number	Description	Package mm x mm	Qty
WLAN & BT IC	WLAN & BT IC in radio module	CYW4373EUBGT	Integrated dual-band 2.4 & 5 GHz IEEE 802.11 a/b/g/n/ac with internal power amplifier, LNA, and support RF T/R switch for 2.4 GHz band, Bluetooth [®] 5.0 supporting BR/EDR/BLE with integrated Class-1 or Class-2 PA, tested compliant to Bluetooth [®] 5.2, WLAN 256-QAM enabling data rate up to 433.3 Mbps, BT UART up to 4 Mbps,, V _{BAT} 3.2 - 4.8 V/V _{DDIO} 1.62 - 3.63 V, T _A -20 to 70°C	WLBGA128 4.5x5.4	1
MCU	MCU onboard	CY8C624ABZI-S2D44	32-bit Cortex-M4F 150 MHz with FPU & MPU & Cortex-M0+ 100 MHz with MPU, 1024 kB SRAM & 2 MB application Flash, QuadSPI/Serial memory interface, 13 configurable serial communication blocks, USB-FS, 2 PDM & 2 I2S audio channels, 32 TCPWM, 12-bit ADC 2 Msps, 2 comparators, CAPSENSE™ touch sensing, Cryptography accelerator, V _S 1.7 – 3.6 V, T _A -40 to 85°C	BGA124 9x9	1
Serial Flash	Memory	S25FL512SAGMFIR10	512 Mb Quad-SPI NOR Flash 3 V, 133 MHz, uniform 256kB sectors, Enhanced High Performance Latency Code, T _A -40 to 85°C	DSO-16 10.3x10.3	1
Ferroelectric RAM	Memory	CY15B104QSN-108SXI	4 Mb non-volatile FRAM with endurance of 100 trillion R/W cycles, 151-year data retention, single and multi SPI (quad SPI), up to 108 MHz SDR & 54 MHz DDR, V_{DD} 1.8 – 3.6 V, T_A -40 to 85°C	SOIC8 5x8	1
HW security controller	Security controller	SLS32AIA010MKUSON1 0XTMA2	High-end security controller for connecting IoT devices to the cloud, with cryptography support for ECC, RSA, AES, HMAC, HKDF, & TLS algorithm, I ² C interface up to 1 MHz with Fast Mode Plus, V _{CC} 1.62 – 5.5 V, temperature range -25 to 85°C	USON10 3x3	1





Connectivity Evaluation Board (Wireless LAN Dual Band)

- > System in Package (SiP) module for Wireless LAN connectivity with option for on-board or external antenna
- > Evaluation software available on Infineon website (WICED[™] Studio)
- > FreeRTOS libraries support & compatible with Arduino Uno connection
- > On-board programmer & debugger via UART-USB bridge and direct USB interface to PC/Laptop
- > Additional features (non-IFX devices): Ethernet, Serial Flash, microSD card interface
- > OPN: <u>CYW943907AEVAL1F</u>
- > SiP WLAN from Murata LBWA1UZ1GC of size 10 x 10 x 1.2 mm, based on CYW43907
- > Single-stream multiplexing up to 150 Mbps, 20/40 MHz channels support, IEEE 802.11 a/b/g/n transfer rates
- > OPN: <u>CYW954907AEVAL1F</u>
- > SiP WLAN from Murata LBWA1UZ1PS-241 of size 10 x 10 x 1.2 mm, based on CYW54907
- Single-stream multiplexing up to 433.3 Mbps, 20/40/80 MHz channels support, IEEE 802.11 a/b/g/n/ac transfer rate, 256-QAM compliant



Product type	Function	Part number	Description	Package mm x mm	Qty
WLAN IC	WLAN IC in SiP 1GC	CYW43907KWBGT	Integrated Dual-band 2.4 & 5 GHz IEEE 802.11a/b/g/n with internal power amplifier & LNA, antenna diversity support, 32-bit Cortex-R4 RISC, 2 MB SRAM, 640 KB ROM, cryptography core, USB2.0, serial & audio interfaces, integrated power supplies, programmable data rate 1 – 150 Mbps, V _{BAT} 3 - 4.8 V/V _{DDIO} 1.8-3.3 V, T _A -30 to 85°C	WLCSP316 45x5.5	1
WLAN IC	WLAN IC in SiP 1PS	CYW54907KWBGT	Integrated Dual-band 2.4 & 5 GHz IEEE 802.11a/b/g/n with internal power amplifier & LNA, antenna diversity support, 32-bit Cortex-R4 RISC, 2 MB SRAM, 640 KB ROM, cryptography core, USB2.0, serial & audio interfaces, integrated power supplies, programmable data rate 1 – 433.3 Mbps, V _{BAT} 3 - 4.8 V/V _{DDIO} 1.8-3.3V, T _A -30 to 85°C	WLCSP316 45x5.5	1

Connectivity Evaluation Board (Bluetooth[®] & BLE)



Overview

- > Fully integrated Bluetooth[®] & BLE module of high transmitter output power with size 13.3 x 22.4 x 1.95 mm
- > Up to 2 Mbps data rate
- > Direct interface to USB of PC/Laptop for quick evaluation
- > Compatible with Arduino Uno connection
- > Evaluation software available in Infineon website (ModusToolbox™)
- > OPN: <u>CYBT-343052-EVAL</u>



Product type	Function	Part number	Description	Package mm x mm	Qty
BT & BLE module	BT & BLE module	CYBT-343052-02	Fully integrated Bluetooth [®] module with onboard crystal oscillators, passive components, power amplifier, 512KB serial flash & BT MCU CYW20735 compatible with Bluetooth [®] 5.0, BLE support, TX output power up to 10dBm for Bluetooth [®] Classic & 12 dBm for BLE, V _S 2.5 – 3.6 V, T _A -30 to 85°C	SMT42 13.3x22.4	1
MCU	Basis BT & BLE MCU	<u>CYW20735B1</u>	32-bit Cortex-M4 96 MHz with FPU, 384KB RAM & 2MB ROM, Bluetooth [®] 5.0 2 Mbps subsystem, PDM, PCM, & I2S audio channels, 6 16-bit PWM, 32-bit RTC, ADC, SPI, UART, I ² C, V _S 1.7 – 3.6 V, T _A -40 to 85°C	QFN60 7x7	
USB – UART bridge controller	USB – UART converter	<u>CY7C65215-</u> <u>32LTXI</u>	USB to Serial Dual channel bridge, USB2.0 Full Speed 12 Mbps, 2-channel configurable UART/SPI up to 3 Mbps, 2-channel configurable I ² C up to 400 kHz, CAPSENSE TM , battery-charge detection (BCD) compliant, operating voltage 1.71 – 5.5 V, T _A -40 to 85°C	QFN32 5x5	1

Connectivity Evaluation Board (Bluetooth[®] & BLE)



- Highly miniaturized & fully integrated dual-mode Bluetooth[®] BR/EDR & BLE and Flash memory module of size 11 x 11 x 1.7 mm
- > Up to 3 Mbps for Bluetooth[®] and 2 Mbps for BLE
- > Compatible with Arduino Uno connection
- > Evaluation software available in Infineon website (ModusToolbox™)
- > Direct interface to USB of PC/Laptop for quick evaluation
- > OPN: <u>CYBT-423054-EVAL</u>
- OPN: <u>CYW920719B2Q40EVB-01</u> (non-module based & including battery operation and non-IFX sensors: analog microphone, 9-axis IMU, and thermistor)

Product type	Function	Part number	Description	Package mm x mm	Qty
BT module	BT module	CYBT-423054-02	Fully integrated Bluetooth [®] module with onboard crystal oscillators, passive components, 512 KB serial flash & BLE MCU CYW20719 compatible with Bluetooth [®] 5.1, TX output power up to 4 dBm, $V_S 2.5 - 3.6 V$, $T_A - 30$ to 85° C	SMT28 11x11	1
USB – UART bridge controller	USB – UART converter	<u>CY7C65215-</u> <u>32LTXI</u>	USB to Serial Dual channel bridge, USB2.0 Full Speed 12 Mbps, 2-channel configurable UART/SPI up to 3 Mbps, 2-channel configurable I ² C up to 400 kHz, CAPSENSE TM , battery-charge detection (BCD) compliant, operating voltage 1.71 – 5.5 V, T _A -40 to 85°C	QFN32 5x5	1
MCU	BT MCU in EVB	<u>CYW20719</u>	32-bit Cortex-M4 96 MHz with FPU, 1MB Flash, 512 KB RAM & 2 MB ROM, Bluetooth [®] 5.1 with BLE 2 Mbps & BT up to 3 Mbps, PDM, PCM, & I2S audio channels, 6 16-bit PWM, 48-bit RTC, ADC, 2 SPI, UART, I ² C, V _S 1.76 – 3.6 V, T _A -40 to 85°C	QFN40 5x5	1









Connectivity Evaluation Board (BLE)



Overview

- > Miniaturized and fully integrated BLE module including antenna of size 14 x 18.5 x 2 mm
- > Up to 2 Mbps data rate
- > On-board debugger compatible with <u>PSoC™ programmer & debugger</u> based on KitProg2 firmware
- > Evaluation software available on Infineon website (PSoC[™] Creator)
- > OPN: <u>CY8CPROTO-063-BLE</u> (independent usage)
- > OPN: <u>CYBLE-416045-EVAL</u> (compatible with Arduino Uno connection)





Product type	Function	Part number	Description	Package mm x mm	Qty
BLE module	BLE module	CYBLE-416045-02	Fully certified and qualified BLE module with onboard crystal oscillators, trace antenna, passive components & BLE MCU PSoC TM 63 BLE compatible with Bluetooth [®] 5.0 up to 2 Mbps, TX output power up to 4 dBm, V_S 1.7 – 3.6 V, T_A -40 to 85°C	SMT43 14x18.5	1
MCU	Basis BLE MCU	<u>PSoC6 CY8C63x6</u> / CY8C63x7	32-bit Cortex-M4F 150 MHz with FPU & MPU & Cortex-M0+ 100 MHz with MPU, 288 KB SRAM & 1 MB application Flash, BLE subsystem, QuadSPI/Serial memory interface, 9 configurable serial communication blocks, 2 PDM & 1 I2S audio channels, 32 TCPWM, 12-bit ADC 1 Msps, CAPSENSE [™] touch sensing, Cryptography accelerator, LCD Drive, Secure Boot, V _S 1.7 – 3.6 V, T _A -40 to 85°C		
MCU	KitProg programmer	<u>CY8C5868LTI-</u> <u>LP039</u>	32-bit Cortex-M3 67 MHz with DMA controller & digital filter processor, 64 kB SRAM & 256 kB Flash & 2 kB EEPROM, Full Speed USB 2.0 & Full CAN, 4 TCPWM blocks, configurable 8 - 20-bit ADC, 4 comparators, 4 OpAmps, V_S 1.71 – 5.5 V, T_A -40 to 85°C	QFN68 8x8	1

Memory Evaluation Board (Ferroelectric RAM)



- Non-volatile Ferroelectric Random Access Memory (FRAM) with fast write speed (at the available bus speed) and 151 years data retention capability
- > OPN: CY15FRAMKIT-001 (256 kb memory size available in SPI & I²C interface)
- To be used with Arduino Uno R3 or PSoC[™] 4 Pioneer Kit (<u>CY8CKIT-042</u>)
- > OPN: <u>CY15FRAMKIT-002</u> (4096 kb memory size available in QuadSPI interface)
- > To be used with Arduino Uno R3 (standard SPI only) or ST Nucleo Kit (Standard & QuadSPI)
- > Evaluation software including driver available on Infineon website



Product type	Function	Part number	Description	Package mm x mm	Qty
Ferroelectric RAM	Memory in v.001	FM25W256-G	256 Kb organized as 32 K x 8, SPI interface up to 20 MHz, direct hardware replacement for serial Flash & EEPROM, V_S 2.7 – 5.5 V, T_A -40 to 85°C	SOIC8 5x6	1
Ferroelectric RAM	Memory in v.001	FM24W256-G	256 Kb organized as 32 K x 8, I ² C interface up to 1 MHz, direct hardware replacement for serial I ² C EEPROM, V _S 2.7 – 5.5 V, T _A -40 to 85°C	SOIC8 5x6	1
Ferroelectric RAM	Memory in v.002	<u>CY15B104QSN-</u> <u>108SXI</u>	4 Mb non-volatile FRAM with endurance of 100 trillion R/W cycles, 151-year data retention, single and multi SPI (quad SPI), up to 108 MHz SDR & 54 MHz DDR, V_{DD} 1.8 – 3.6 V, T_A -40 to 85°C	SOIC8 5x8	1
MCU in KIT 042	Control interface	<u>CY8C4245AXI-</u> <u>483</u>	32-bit Cortex-M0 48 MHz CPU clock 4 KB SRAM & 32 KB Flash with 4 TCPWM blocks & Comparator- based triggering of Kill signals for motor drive, 2 OpAmps, CAPSENSE [™] , LCD drive capability on GPIOs, V _S 1.71 – 5.5 V, T _A -40 to 105°C	TQFP44 12x12	1

Memory Evaluation Board (non-volatile SRAM)



- > 16 Mb non-volatile Static Random Access Memory (SRAM) with integrated Real Time Clock (RTC)
- > Equipped with 0.1 F super capacitor to enable RTC power back-up for more than 2 days
- > OPN: CY14NVSRAMKIT-001
- Evaluation software including driver available in Infineon website developed for use with legacy MCU board (<u>FM4-U120-9B560</u>) that can be easily ported to any C-based MCU platform only by changing the HW I/O interface





Product type	Function	Part number	Description	Package mm x mm	Qty
Non-volatile SRAM	Non-volatile SRAM	<u>CY14B116M-</u> <u>BZ45XI</u>	16 Mb nvSRAM with 45 ns access time, 2 configurations 2048 KB of 8-bit or 1024 KB of 16-bit, RTC with programmable frequency of the square wave output, $V_S 2.7 - 3.6 V$, $T_A -40$ to $85^{\circ}C$ – alternative with 25 ns access time CY14B116M-ZSP25XI (TSSOP54)	FBGA165 15x17	1
MCU	Control interface	MB9BF568R – discontinued	32-bit Cortex-M4F 160 MHz with FPU & MPU & DSP support, 128 kB SRAM & 1 MB application Flash, external memory interface for SDRAM, SRAM, NOR & NAND Flash, USB, CAN interface up to 1 Mbps, configurable serial communication, 12-bit ADC, RTC, multi-function timer, quadrature position/revolution counter for encoder interface, CRC accelerator, SDCard interface, V _S 2.7 – 5.5 V, T _J -40 to 125°C	LQFP120 16x16	1





Security Evaluation Board (Trust X)

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Overview

- > Pre-programmed security controller supporting cryptography algorithms ECC 256, AES-128 and SHA-256
- > Generation & Verification of digital signatures
- > Generation of a single key and public private key pair
- > OPN: <u>S2GOSECURITYOPTIGAXTOBO1</u> (without MCU Kit board)
- Easy to use with Arduino Uno using the available adapter (<u>MYIOTADAPTERTOBO1</u>) or with XMC1100 S2GO (<u>KITXMC2GOXMC1100V1TOBO1</u>) or XMC4700 Relax Kit (<u>KITXMC47RELAXV1TOBO1</u>)
- > <u>Arduino library</u> and <u>FreeRTOS demo code</u> available in Github
- > Other features available for evaluation in XMC4700 Relax Kit: CAN bus communication, Ethernet protocol, QuadSPI serial Flash, and FreeRTOS operation
- > OPN: OPTIGATRUSTXEVALKITTOBO2 (with XMC4500 MCU) with Getting Started guide available in Github

Product typeg	Function	Part number	Description	Package mm x mm	Qty
Security controller IC	Security controller	SLS32AIA020X2	Embedded security controller for connected devices, with symmetric/asymmetric cryptography engines supporting ECC256, AES128, and SHA256, I ² C interface up to 1 MHz with Fast Mode Plus, $V_S 1.62 - 5.5 V$, T_J -40 to 105°C	USON10 3x3	1
MCU	Control interface in XMC4700 Kit	<u>XMC4700-</u> F144K2048	32-bit Cortex-M4 144 MHz with FPU & MPU, 352 KB SRAM & 2048 KB Flash with configurable 6 serial channels, CAN interface, Ethernet MAC module, USB, EBU for external memories, SDMMC, Touch-Sense controller, T _A -40 to 125°C	LQFP144 22x22	1
CAN transceiver	CAN transceiver	IFX1051LE	Industrial qualified CAN transceiver up to 1Mbps transmission rate suitable for 12 & 24 V applications – replaceable with <u>TLE6250G</u> , automotive qualified	DSO8 4x5	1
MCU	Control interface in XMC4500 Kit	<u>XMC4500-</u> F100K1024	32-bit Cortex-M4 120 MHz with FPU & MPU, 160 KB SRAM & 1024 KB Flash with configurable 6 serial channels, CAN interface, Ethernet MAC module, USB, EBU for external memories, SDMMC, Touch-Sense controller, T _A -40 to 125°C	LQFP100 22x22	1



Security Evaluation Board (Trust M)



Overview

- Pre-programmed security controller supporting cryptography algorithms ECC NIST curves up to P-521, ECC Brainpool curve up to
 P-512, RSA® up to 2048, AES key up to 256, HMAC up to SHA512, HKDF up to SHA512 and SHA-256
- > Generation & Verification of digital signatures
- > Encryption & Decryption of cryptographic keys
- > OPN: <u>S2GOOPTIGAMCLOUDTOBO1</u> (without MCU Kit board)
- > To be used with the adapter (MYIOTADAPTERTOBO1) and XMC4800 IoT Kit (KITXMC48IOTAWSWIFITOBO1)
- > <u>Getting started guide</u> & <u>FreeRTOS demo code</u> available in Github
- Other features available for evaluation in XMC4800 IoT Kit: CAN bus communication, Ethernet Control Automation Technology (CAT) slave protocol, 2.4 GHz Wi-Fi module (based on ESP8266EX IC – non IFX device), and FreeRTOS operation
- > Possibility to interface with XMC4700 Relax Kit (KITXMC47RELAXV1TOBO1) with FreeRTOS demo code in Github

Socket 1 Socket	infineon	A A A A A A A
Adapter		
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Product type	Function	Part number	Description	Package mm x mm	Qty
Security controller IC	Security controller	SLS32AIA010ML	Embedded security controller for connected devices, with symmetric/asymmetric cryptography engines supporting ECC, RSA, AES, HMAC, & HKDF algorithm, I ² C interface up to 1MHz with Fast Mode Plus, $V_S 1.62 - 5.5 V$, $T_J -40$ to $105^{\circ}C$	USON10 3x3	1
MCU	Control interface	XMC4800- F100K2048	32-bit Cortex-M4 144 MHz with FPU & MPU, 352 KB SRAM & 2048 KB Flash with configurable 6 serial channels, CAN & EtherCATSlave interface, Ethernet MAC module, USB, EBU for external memories, SDMMC, Touch-Sense controller, T _A -40 to 125°C	LQFP100 16x16	1
CAN transceiver	CAN transceiver	IFX1051LE	Industrial qualified CAN transceiver up to 1 Mbps transmission rate suitable for 12 & 24 V applications – replaceable with <u>TLE6250G</u> , automotive qualified	DSO8 4x5	1
LDO	1.8V for Ethernet PHY IC	IFX54441LDV	LDO 300 mA output, 2.5% output voltage accuracy, reverse polarity, overcurrent, over-temperature protection, input voltage 1.8 V to 20 V – replaceable with <u>TLS203B0EJV</u>	TSO10 3.3x3.3	1
LDO	Voltage regulator	IFX1117MEV33	3.3 V LDO 1A output, $\pm 2\%$ precision, short circuit & over-temperature protection, input voltage 4.7 V to 15 V – similar I _{OUT} replacement <u>TLE4284DV33</u> (different packaging – DPAK)	SOT223	1



Security Evaluation Board (Trust CHARGE)

- Inductive wireless charging authentication supporting cryptography algorithms SHA-256 & ECC NIST P256/P384
- > Generation & Verification of digital signature and Key Generation
- Equipped with preprogrammed locked OS, locked application code, and host-side modules to integrate with host MCU software
- > OPN: <u>TRUSTCHARGEEVALKITTOBO1</u> (full evaluation kit with XMC4700 & adapter boards)
- > Evaluation software available on Github & Infineon website



Product type	Function	Part number	Description	Package mm x mm	Qty
Authentication IC	Authentication IC	SLS32AIA020U3	Authentication IC following the Qi 1.3 wireless charging standard & compliant to USB-C authentication standard, with symmetric/asymmetric cryptography engines supporting ECC 256/384 and SHA-256, I ² C interface up to 1 MHz with Fast Mode Plus, V _S 1.62 – 5.5 V, T _J -40 to 105°C	USON10 3x3	1
MCU	Control interface	<u>XMC4700-</u> <u>F144K2048</u>	32-bit Cortex-M4 144 MHz with FPU & MPU, 352 KB SRAM & 2048 KB Flash with configurable 6 serial channels, CAN interface, Ethernet MAC module, USB, EBU for external memories, SDMMC, Touch-Sense controller, T_A -40 to 125°C	LQFP144 22x22	1
CAN transceiver	CAN transceiver	IFX1051LE	Industrial qualified CAN transceiver up to 1 Mbps transmission rate suitable for 12 & 24 V applications – replaceable with <u>TLE6250G</u> , automotive qualified	DSO8 4x5	1
LDO	Voltage regulator	IFX1117MEV33	3.3 V LDO 1 A output, ±2% precision, short circuit & over-temperature protection, input voltage 4.7 V to 15 V – similar I_{OUT} replacement <u>TLE4284DV33</u> (different packaging – DPAK)	SOT223	1



JUMPER

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VCC1

GND1

SWIT

V1.1

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Security Evaluation Board (Trust B)

allowing efficient counterfeit detection

OPN: OPTIGATRUSTBAPPBOATOBO1

unique key pair per chip

authentication operation

Overview

DEBUG REMOTE GND2 **POWER 2** POINTS VCC2 VDDE O GND2 SW12 G GND2 ALLIN LINK Authentication solution with asymmetric ECC 131-bit key length VCC2 VCC2 ISOLATION 0 SWI2 SWI2 GND in. OPTIGA[™] Digital Certificate (ODC) with Device Personalization generating VCCE2 GND2 REMOTE DEBUG SWI2 512b non-volatile memory space for user data POINTS **POWER 1** State Test GND1 VCC2 2 Operational ICs allowing evaluation of the introduction of single or multiple VDD1 🔘 💽 VCC1 GND1 GND1 VCC1 SWI1 OPTIGA[™] Trust B VCC1 SLE95xxx SWI1 SWI1 Host software can be made available upon NDA signatures with Infineon (IN) GND1 4/2017

Product type	Function	Part number	Description	Package mm x mm	Qty
Authentication IC	Authentication IC	<u>SLE95250</u>	Authentication IC with 131-bit ECC engine, digital certificate with device personalization, Message Authentication Code (MAC) function, 512b user non-volative memory, single-wire interface (SWI) up to 500 kbps, $V_S 2 - 5.5 V$, T_J -40 to 85°C	TSNP6 1.1x1.5	2

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Security Evaluation Board (Authenticate S)

- > Authentication solution with asymmetric 163-bit ECC allowing efficient counterfeit detection
- > 193-bit OPTIGA™ Digital Certificate (ODC) and 96-bit unique chip ID
- > Message Authentication Code (MAC) function for user data authentication
- > 32-bit lockable user non-volatile memory up to 5 Kb
- > Option for MAC based Host Authentication
- > I²C or SWI for I/O interface and GPO for output interface
- → Host MCU based on PSoC[™] 63 with wireless connectivity
- > OPN: EVALKITOPTIGAAUTHSTOBO1
- > Included pre-loaded software and GUI interaction with no coding required
- > OPN: DEVKITOPTIGAAUTHSTOBO1
- > Allows building of SDK from source code using ModusToolbox™ available on Infineon website





Product type	Function	Part number	Description	Package mm x mm	Qty
Authentication IC	Authentication IC	<u>SLE95415</u>	Authentication IC with 163-bit ECC engine, 193-bit ODC, 96-bit unique chip ID, Message Authentication Code (MAC) function, 5 Kb user non-volative memory, I ² C interface up to 400 kHz clock, single-wire interface (SWI) witth bus frequency up to 500 kHz, V_S 1.8 – 5.5 V, T_J -40 to 85°C extended to 110°C	TSNP6 1.1x1.5	4



500 V_{RMS} digital sink input



500 V_{RMS} digital high-side output



2500 V_{RMS} digital high-side output



Isolation Evaluation Board (for Input)



- Robust 2.5 kV galvanic isolation based on coreless transformer technology for MCU protection from noisy environment/process-side
- > Complete integration of 8 channels of digital input, galvanic isolation & MCU/ASIC interface
- > Status LED output for each digital input
- > Parallel/Serial (SPI) data output interface to the external MCU
- > OPN: EVALISO1I811TTOBO1 (up to 125 kHz sampling frequency)
- OPN: <u>EVALISO1I813TTOBO1</u> (up to 500 kHz sampling frequency, programmable filter setting of each channel input, synchronous capture of input signals from multiple input Ics, comprehensive diagnostics enabling Preventive Maintenance)



Product type	Function	Part number	Description	Package mm x mm	Qty
Isolated interface	Input isolation	<u>ISO1I811T</u>	24 V isolated 8-channel digital input, with 8-bit parallel/serial interface, up to 125 kHz sampling frequency, 1-state of the ERROR pin for process-side supply voltage V_{BB} < Vthreshold, V_{BB} 9.6 – 35 V, T _J -40 to 125°C	TSSOP48 8x12.5	2
Isolated interface	Input isolation	<u>ISO1I813T</u>	24 V isolated 8-channel digital input, with 8-bit parallel/serial interface, up to 500 kHz sampling frequency, comprehensive diagnostics (e.g. wire-break detection), 3-state of the ERROR pin for process-side supply voltage V_{BB} monitoring, V_{BB} 9.6 – 35 V, T_J -40 to 125°C	TSSOP48 8x12.5	2



Isolation Evaluation Board (for Output)

- Robust 2.5 kV galvanic isolation based on coreless transformer technology for MCU protection from noisy environment/process-side
- > Complete integration of MCU/ASIC interface, galvanic isolation & 8 high-side output switches
- Maximum current limit, short-circuit & overcurrent & overvoltage & ESD protections, undervoltage shutdown with autorestart & hysteresis, thermal shutdown with restart
- > Parallel/Serial (SPI) data output interface to the external MCU
- > OPN: EVALISO1H811GTOBO1 (up to nominal 0.7 A load output/channel & parallel interface)
- > OPN: EVALISO1H812GTOBO1 (up to nominal 0.7 A load output/channel & serial interface)
- > OPN: EVALISO1H815GTOBO1 (up to nominal 1.4 A load output/channel & parallel interface)
- > OPN: EVALISO1H816GTOBO1 (up to nominal 1.4 A load output/channel & serial interface)



Product type	Function	Part number	Description	Package mm x mm	Qty
Isolated interface	Output isolation	ISO1H811G	24 V isolated 8-channel high-side switches of 0.7 A each with 8-bit parallel 3.3/5 V CMOS operation compatible interface, V_{BB} monitoring, V_{BB} 11 – 35 V, T_J -25 to 125°C	DSO36 14x16	2
Isolated interface	Output isolation	ISO1H812G	24 V isolated 8-channel high-side switches of 0.7 A each with 8-bit SPI 3.3/5 V CMOS operation compatible interface, V_{BB} monitoring, V_{BB} 11 – 35 V, T_J -25 to 125°C	DSO36 14x16	2
Isolated interface	Output isolation	ISO1H815G	24 V isolated 8-channel high-side switches of 1.4 A each with 8-bit parallel 3.3/5 V CMOS operation compatible interface, V _{BB} monitoring, V _{BB} 11 – 35 V, T _J -25 to 125°C	DSO36 14x16	2
Isolated interface	Output isolation	<u>ISO1H816G</u>	24 V isolated 8-channel high-side switches of 1.4 A each with 8-bit SPI 3.3/5 V CMOS operation compatible interface, V_{BB} monitoring, V_{BB} 11 – 35 V, T_J -25 to 125°C	DSO36 14x16	2

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Isolation Evaluation Board (for Output)

- Robust 2.5 kV galvanic isolation based on coreless transformer technology for MCU protection from noisy environment/process-side with comprehensive diagnostics
- > Complete integration of MCU/ASIC interface, galvanic isolation & 8 high-side output switches
- > Comprehensive diagnostics enabling Preventive Maintenance
- Maximum current limit, short-circuit & overcurrent & reverse output voltage & ESD protections, undervoltage shutdown with autorestart & hysteresis, thermal shutdown & diagnostics per channel with auto-restart
- > Parallel/Serial (SPI) data output interface to the external MCU
- > OPN: EVALISO2H823V25TOBO1 (up to 0.6 A load output/channel)

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Product type	Function	Part number	Description	Package mm x mm	Qty
Isolated interface	Output isolation	ISO2H823V2.5	24 V isolated 8-channel high-side switches of 0.6 A each with 8-bit parallel/serial 3.3 V CMOS operation compatible interface, common output disable & error indication pins, 3-state of V _{BB} monitoring, V _{BB} 11 – 35 V, T _J -25 to 125°C	VQFN70 12x12	2

Power & Battery Management selection







Power Management Evaluation Board (LDO)

- Low dropout adjustable standby linear voltage regulator with input voltage up to 42 V & output current 70 mA
- Functional supply voltage range: 4.7 42 V
- > Adjustable output voltage up to 36 V (absolute rating)
- Adjusting output voltage by changing the on-board resistors of the voltage divider & applying feedback off-board via the on-board connector
- > Enable input & over temperature shutdown
- > Overcurrent, short-circuit, and reverse polarity protection
- > OPN: <u>TLT807B0EPVBOARDTOBO1</u>



Product type	Function	Part number	Description	Package mm x mm	Qty
LDO	Voltage regulator	<u>TLT807B0EPV</u>	Adjustable output voltage LDO with up to 70 mA, $\pm 2\%$ output voltage accuracy, 0.5 V max. dropout voltage, input voltage up to 42 V, protections of overvoltage, overcurrent, short circuit, reverse polarity, over temperature shutdown, T _J -40 to 150°C, automotive qualified	TSDSO14 5x6	1


Power Management Evaluation Board (LDO)

- Low dropout selectable linear voltage regulator with input voltage up to 40 V & output current 350 mA
- > Functional supply voltage & enable signal up to 40 V
- > Selectable output voltage between 3.3 V or 5 V
- Selecting output voltage by selecting the appropriate jumper and soldering the onboard missing resistor of the voltage divider
- > Adjustable reset threshold down to 2 V
- Adjusting output voltage by selecting the appropriate jumper and soldering the onboard missing resistor of the voltage divider
- > Enable input & reset output
- > Overcurrent protection & over temperature shutdown
- > OPN: TLS835D2ELVSEBOARDTOBO1



Product type	Function	Part number	Description	Package mm x mm	Qty
LDO	Voltage regulator	TLS835D2EL VSE	Selectable 3.3 V or 5 V output voltage LDO with up to 350 mA, $\leq \pm 2\%$ output voltage accuracy, 0.6 V/0.5 V max. dropout voltage at output 3.3 V/5 V, input voltage up to 40 V, protections of overcurrent and over temperature, T _J -40 to 150°C, automotive qualified	SSOP14 5x6	1



Power Management Evaluation Board (LDO)

- Low dropout adjustable linear voltage post regulator with input voltage up to 20 V & output current 500 mA
- > Functional supply voltage range: 2.3 20 V
- > Adjustable output voltage from 1.22 V to 20 V dropout voltage
- Adjusting output voltage by selecting the appropriate jumper and soldering the onboard missing resistor of the voltage divider
- > Enable input
- > Overcurrent, reverse polarity, and over temperature protection
- > No reverse current & no protection diode required
- > OPN: <u>TLS205B0LDVBOARDTOBO1</u>



Product type	Function	Part number	Description	Package mm x mm	Qty
LDO	Voltage regulator	TLS205B0LDV	Adjustable output voltage LDO with up to 500 mA, $\pm 2.5\%$ output voltage accuracy, 0.45 V max. dropout voltage, input voltage up to 20 V, protections of overcurrent, reverse polarity, and over temperature, T _J -40 to 150°C, automotive qualified	TSON10 3.3x3.3	1



Power Management Evaluation Board (Step Down Controller)

- Step down controller with Adjustable output voltage (lowest 1.2 V) and External Power Stage providing flexible output current capability up to 10 A
- > Equipped with external power stage: dual N-channel MOSFET
- > Enable input, soft-start function, and input under voltage lockout (UVLO)
- > OPN: <u>DEMOBOARDTLF51801ELTOBO1</u> (General step-down application)
- > Supply voltage range: 6 40 V & preset to output 5.6 V and max. 5 A
- > 2 ways of current limit implementation: via shunt resistor or via R_{DS(on)} of the high side MOSFET
- > OPN: <u>USBCHARGERDEMO2TOBO1</u> (USB Charging application)
- > Expected input 12 V & preset to output ~5 V and ~5.8 A
- > Current limit implementation via R_{DS(on)} of the high side MOSFET



Product type	Function	Part number	Description	Package mm x mm	Qty
Step-down controller	Voltage regulator	<u>TLF51801ELV</u>	Adjustable output voltage Synchronous step down controller with up to 10 A, $\pm 2\%$ output voltage accuracy, lowest output voltage 1.2 V, integrated bootstrap diode, external power transistors, switching frequency from 100 to 700 kHz, 5.4 V LDO operation up to 50 mA, input voltage from 4.75 to 45 V, soft-start function, input under voltage lockout, T _J -40 to 150°C, automotive qualified	SSOP14	1
Dual N+N MOSFET	Switches for Demo board	IPG16N10S4-61A	100 V OptiMOS [™] T2 Power Transistor 61 mΩ with continuous I _D 6.3 A at T _C 150°C & V _{GS} ≥ 6 V & max. Q _g 7 nC, AEC qualified	TDSON8 5.2x6.5	1
Dual N+N MOSFET	Switches for USB charger board	IPG20N06S2L-35A	55 V OptiMOS [™] Power Transistor 35 mΩ with continuous I _D 12 A at T _C 150 ^o C & V _{GS} ≥ 6 V & max. Q _g 23 nC, AEC qualified	TDSON8 5.2x6.5	1



Power Management Evaluation Board (PMIC)

- Power Management IC providing one 3.3 V and 2 post regulators: adjustable between 0.9 to 1.3 V (nominal at 1.25 V) and 5 V
- Functional supply voltage range: 3.7 35 V
- Programmable switching frequency within 1.8 to 2.5 MHz in 100 kHz step – nominal at 2.2 MHz
- 2 voltage monitoring channels with monitoring inputs & enable outputs to control/monitor external regulators
- > Enable input
- > 16-bit SPI interface for IC control/programming
- > Overcurrent & over temperature detection
- > OPN: TLF30681QVS01BOARDTOBO1





Product type	Function	Part number	Description	Package mm x mm	Qty
PMIC	PMIC	TLF30681QVS01	Multiple rails PMIC with the main step-down converter of 3.3 V output 2.3 A supplying to 2 LDOs with $\pm 2\%$ output voltages accuracy: LDO1 0.9 – 1.3 V up to 1 A, LDO2 5 V up to 250 mA, voltage monitoring channels with enable signal & monitoring signal, input voltage 3.7 – 35 V, T _J -40 to 150°C, automotive qualified	VQFN48 7x7	1



Power Management Evaluation Board (PMIC)

Overview

- Power Management IC providing 3 outputs: 5 V, selectable 3.3 V or 2.6 V, & 1.3 V, and 2 tracking regulators of 50 mA & 105 mA for the 5 V output voltage
- Additional standby LDO 30 mA pre-adjusted to 2.6 V
- > Functional buck input voltage range: 4.5 45 V
- > Standby mode with standby regulator remains active
- > Reset outputs and Enable inputs
- > Undervoltage detection & overcurrent protection
- > Over temperature shutdown
- > OPN: DEMOBOARDTLE73683ETOBO1





Product type	Function	Part number	Description	Package mm x mm	Qty
PMIC	PMIC	<u>TLE7368-3E</u>	Microcontroller power supply system with the main step-down converter of 5.5 V output 2.5 A supplying to 3 LDOs, ±2% output voltages accuracy, LDO1 5 V 800 mA limit, LDO2 3.3 V or 2.6 V 700 mA limit, LDO3 1.3 V, 2 tracking regulators for the LDO1 5 V output, standby regulator 30 mA selectable between 1 V or 2.6 V, input voltage for standby/buck $3/4.5 - 45$ V, T _J -40 to 150° C, automotive qualified	DSO36 10x12.8	1

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Power Management Evaluation Board (USB-PD)

Overview

- USB Type-C Power Delivery PD3.1 Microcontroller Gen1 (PMG1) with HMI capability
- > PD sink implementation with up to 28 V and 5 A capability
- → Included CAPSENSE[™] evaluation components: 2 buttons & 5-segment slider
- On-board programmer & debugger compatible with <u>PSoC™ programmer &</u> <u>debugger</u> based on KitProg3 firmware
- > Evaluation software available in Infineon website (ModusToolbox™)
- > OPN: <u>CY7113</u>
- Notes: less features and lower count of GPIOs evaluation boards are available under OPN CY7112, CY7111, and CY7110 (without HMI evaluation components)





Product type	Function	Part number	Description	Package mm x mm	Qty
MCU (PMG1-S3)	USB-C & PD controller	CYPM1311-48LDXI	Integrated USB-C and Power Delivery (PD) controller with 32-bit Cortex-M0+ 48 MHz with DMA, 32 kB SRAM & 256 kB Flash, Dual Role Power (DRP), USB2.0, HW Crypto, 5 configurable out of 7 serial interfaces, 7 TCPWM blocks, 12-bit ADC, bus voltage 4 – 28 V, system $V_S 2.8 - 5.5 V$, $T_A -40$ to $85^{\circ}C$	QFN48 6x6	1
MCU	KitProg3 programmer	CY8C5868LTI-LP039	32-bit Cortex-M3 67 MHz with DMA controller & digital filter processor, 64kB SRAM & 256 kB Flash & 2 kB EEPROM, Full Speed USB 2.0 & Full CAN, 4 TCPWM blocks, configurable 8 - 20-bit ADC, 4 comparators, 4 OpAmps, $V_S 1.71 - 5.5 V$, $T_A - 40$ to $85^{\circ}C$	QFN68 8x8	1
P-MOSFET	20 V protection circuit	BSS308PE	P-channel -30 V OptiMOS [™] P3 Small-Signal Transistor 80 mΩ with continuous I _D -1 A at T _A 120°C & V _{GS} ≤-10 V & typical Q _g 5 nC, automotive qualified	SOT23 2.6x2.9	3
N-MOSFET	USB-C 5 A load switch	BSC059N04LS6	40 V OptiMOS [™] 6 Power Transistor 5.9 mΩ with continuous I _D 24 A at T _C 150°C & V _{GS} ≥ 10 V & typical Q _g 9.4 nC	TDSON8FL 5.2x6.2	2
LDO	3.3 V provider	TLE42744GS V33	3.3 V LDO up to 400 mA, ±2% output voltage accuracy, output current limit, reverse polarity protection & over temperature shutdown, V_{IN} 4.7 V to 40 V, T_{J} -40 to 150°C, automotive qualified	SOT-223 6.5x7	1

Power Management Evaluation Board (USB-PD)



Overview

- USB Type-C Power Delivery Microcontroller capable of controlling 2 USB-C Ports simultaneously
- > Included 2 base boards, 2 USB Type-C to xType-A adapters and the necessary USB cables
- Available features to evaluate: Dual Role Power (DRP) port, SuperSpeed USB, and DisplayPort
- > Evaluation software available in Infineon website
- > OPN: <u>CY4541</u>



Product type	Function	Part number	Description	Package mm x mm	Qty
MCU (CCG4)	Dual Port USB-C & PD controller	<u>CYPD4225-</u> <u>40LQXIT</u>	Integrated Dual ports USB-C and Power Delivery (PD) controller with 32-bit Cortex-M0 48 MHz, 8 kB SRAM & 128 kB Flash, PD2.0, integrated oscillator, 4 configurable serial communication blocks, 4 timers & counters/TCPWM blocks, integrated dead battery termination for DRP applications, V_{OP} 2.7 – 5.5 V, T_A -40 to 85°C – replaceable with <u>CYPD4226-40LQXIT</u> with PD3.0 but 2 less TCPWM blocks	QFN40 6x6	1
USB – UART bridge controller	USB – UART converter	<u>CY7C65215-</u> <u>32LTXI</u>	USB to Serial Dual channel bridge, USB2.0 Full Speed 12 Mbps, 2-channel configurable UART/SPI up to 3 Mbps, 2-channel configurable I ² C up to 400 kHz, CAPSENSE TM , battery-charge detection (BCD) compliant, operating voltage $1.71 - 5.5$ V, T _A -40 to 85° C	QFN32 5x5	1

Power Management Evaluation Board (USB-PD and Charger)

- 65 W USB-PD Type-C Programmable Power Supply (PPS) charger with hybrid flyback topology >
- Compact form-factor design with high power density of 31 W/in³ of dimension 46 x 37 x 20.2 mm and Peak efficiency 93.8% >
- Wide input voltage 90~264 VAC >
- Fixed output: 5 V/3 A, 9 V/3 A, 12 V/3 A, 15 V/3 A, 20 V/3.25 A while PPS output: 5~20 V / 3 A >
- OPN: DEMOXDPS220165W1TOBO1 >

Product type	Function	Part number	Description	Package mm x mm	Qty
Controller	Hybrid flyback controller	XDPS2201	Digital hybrid-flyback controller with integrated half-bridge driver, 600 V start-up cell for fast charging, wide range of configurable parameters via 1 pin UART interface, provides continuous resonant mode (CRM) operation, zero voltage resonant valley switching (ZV-RVS) & burst mode to support highest efficiency, T _J -25 to 125°C	DSO-14 10x6	1
N-MOSFET	High-side switch	IPD60R180C7	600 V CoolMOS™ C7 superjunction MOSFET, 180 mΩ, continuous I _D 8 A at T _C 100°C & typical Q _g 24 nC	DPAK 10x6.5	1
N-MOSFET	Low-side switch	IPP60R180C7	600 V CoolMOS™ C7 superjunction MOSFET, 180 mΩ, continuous I _D 8 A at T _C 100°C & typical Q _g 24 nC	TO-220	1
N-MOSFET	Synchronous rectification switch	BSC093N15NS5	150 V OptiMOS™ 5 power MOSFET, 9.3 mΩ, continuous I _D 55 A at T _C 100°C & typical Q _g 33 nC	TDSON8 5.2x6.2	1
P-MOSFET	Safety / load switch	<u>BSZ086P03NS3</u> <u>G</u>	-30 V OptiMOS™ P3 power transistor, 8.6 mΩ, continuous I _D -40 A at T _C 70°C & typical Q _g 43.2 nC	TSDSON8 3.3x3.3	1
N-MOSFET	VCC regulator switch	<u>BSS169</u>	100V SIPMOS® small signal transistor depletion mode, 12 Ω , continuous I _D 0.14 A at T _A 70°C & typical Q _g 2.1 nC	SOT23 2.6x2.9	1
Controller	USB-C & PD controller	<u>CYPD3174-</u> 24LQXQ	Single port USB-C and Power Delivery (PD) controller with 32-bit Cortex-M0 48 MHz, 64 kB Flash, 8 kB SRAM, USB PD Rev 3.1 including PPS mode, integrated VBUS regulator & CSA, DFP CC with opto-coupler feedback bootloader, V_{OP} 3 – 24.5 V, T_A -40 to 105°C	QFN-24 4x4	1







Power Management Evaluation Board (USB-PD and Charger with GaN)

- > 140 W USB-C charger with PFC + Zero Voltage Switching (ZVS) hybrid flyback topology (asymmetrical half-bridge)
- > Power density of 22.67 W/in³ of dimension 109.5 x 38.5 x 24 mm and 2-layer PCB for low system cost
- > Configurable PFC Quasi-Resonant Mode operation & automatic PFC dis/enable-control depending on the operation conditions
- > Output voltages of 5 V, 9 V, 15 V, 20 V, and 28 V with output current max. 5 A
- > OPN: <u>REFXDPS2221140W1TOBO1</u>

Product type	Function	Part number	Description	Package mm x mm	C
Controller	PFC + hybrid flyback controller	XDPS2221	Digital PFC-boost and DC-DC hybrid-flyback controller, ZVS operation of high-side and low-side switch, adaptive PFC bus voltage level following operating conditions, meant to be used in USB-PD chargers / adapters with wide output voltage up to 28 V, 600 V at high voltage pin, T_J -25 to 125°C	DSO-14 10x6	1
GaN HEMT	PFC & half-bridge switches	IGLD60R190D1	600 V CoolGaN™ enhancement mode power transistor, 190 mΩ, continuous I _D 10 A at T _C 25°C & typical Q _g 3.2 nC	LSON-8 8x8	3
N-MOSFET	Synchronous rectification switch	BSC040N10NS5	100 V OptiMOS [™] 5 power MOSFET, 4 mΩ, continuous I _D 86 A at T _C 100°C & V _{GS} 10 V, and typical Q _g 58 nC	TDSON8 5.2x6.2	1
P-MOSFET	Safety / load switch	<u>IRF7240</u>	-40 V HEXFET® power MOSFET, 15 mΩ, continuous I _D -8.6 A at T _A 70°C & V _{GS} -10 V, and typical Q _g 73 nC	SO-8 5x6	1
N-MOSFET	VCC regulator switch	<u>BSS169</u>	100V SIPMOS® small signal transistor depletion mode, 12 Ω , continuous I _D 0.14 A at T _A 70°C & typical Q _g 2.1 nC	SOT23 2.6x2.9	1
Controller	USB-C & PD controller	<u>CYPD3175-</u> 24LQXQ	Single port USB-C and Power Delivery (PD) controller with 32-bit Cortex-M0 48 MHz, 64 kB Flash, 8 kB SRAM, USB PD Rev 3.1 including PPS mode, integrated VBUS regulator & CSA, DFP CC with direct feedback bootloader, V_{OP} 3 – 24.5 V, T_A -40 to 105°C	QFN-24 4x4	1





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Power Management Evaluation Board (Charger)

- 84 W battery charger charger with quasi-resonant (QR) flyback topology scalable from 65 W and up to 130 W
- > Aimed for 12 V/ 18 V Li-ion battery pack
- > Input voltage 176~264 VAC and 47~63 Hz
- > Output voltage 9 21V up to 4 A
- > Efficiency more than 90% at 230 VAC input and full-load condition
- > OPN: <u>REFICC80QSG84W1BPATOBO1</u>





Product type	Function	Part number	Description	Package mm x mm	Qty
Controller	PWM flyback controller	ICC80QSG	Flyback controller with secondary side regulation for battery charging current control, quasi-resonant mode (QRM) operation with continuous conduction mode (CCM) prevention & valley switching discontinuous conduction mode (DCM) in mid to light load, set of protections: OTP, OVP, OCP, brown-in & out, T _J -40 to 150°C	DSO-8 5x6	1
N-MOSFET	Primary switch	IPN70R450P7S	700 V CoolMOS™ P7 power transistor, 450 mΩ, continuous I _D 6.5 A at T _C 100ºC & typical Q _g 13.1 nC	SOT223 6.5x7	1



Power Management Evaluation Board (GaN HEMT)

- > Half-bridge Configuration based on GaN with generic topology
- External inductor interface to configure for boost or buck mode, double-pulse testing or continuous PWM operation, hard or softswitching
- Single PWM input to connect to 50 Ω pulse or signal generator
- Switching frequency up to several MHz depending on transistor dissipation
- Isolated 5V gate driver power supply with input logic providing adjustable dead time (preset to 100 ns)
- Output voltage up to 450 V (limited by capacitor rating) with continuous current 12 A and peak 35 A, hard or soft switching
- > OPN: EVAL1EDFG1BHBGANTOBO1









Product type	Function	Part number	Description	Package mm x mm	Qty
GaN HEMT	Switch	IGOT60R070D1A UMA3	600 V CoolGaN [™] Power Transistor 70 mΩ with continuous I _D 14 A at T _C 125°C, typical Q _g 5.8 nC, typical gate resistance 0.78 Ω, no reverse recovery charge, top-side cooling, T _J -55 to 150°C	DSO20 14x16	2
GaN Gate driver	Gate driver	<u>1EDF5673K</u>	Single channel gate driver IC dedicated for high voltage GaN power transistors, on-resistance 0.85 Ω source, 0.35 Ω sink, single output supply voltage 6.5 – 20 V, max. 44ns propagation delay of PWM to output, output current source 4 A & sink 8 A, T _J -40 to 150°C	LGA13 5x5	2



Battery Management Evaluation Board

- Battery cell monitoring & balancing (BMS) IC for Lithium Ion together with its UART-based transceiver IC
- > Option to connect real battery pack or power supply with the on-board dummy resistors to emulate the cells
- > Isolated UART interface between BMS board and Transceiver board
- > OPN: <u>TLE9012DQUDTRBMS2TOBO1</u> (BMS IC board)
- Functional supply voltage range: 5 60 V
- > OPN: <u>TLE9015DQUTRXBRGTOBO1</u> (isolated UART Transceiver board)
- > Connecting up to 2 BMS boards via isolated UART interface
- ➤ To be used with AURIX[™] TC265 TFT board (<u>KITAURIXTC265TFTTOBO1</u>) for powering the Transceiver board and connecting to PC/Laptop for evaluation



Product type	Function	Part number	Description	Package mm x mm	Qty
Battery management IC	Battery management IC	TLE9012DQU	Voltage monitoring IC up to 12 Li-ion cells in series, integrated balancing switch up to 0.2 A balancing current, 5 temperature measurement channels for external NTCs (negative temperature coefficient thermistor), hot-plugging support, 16-bit delta-sigma ADC, differential serial interface 2 Mbps, 4 GPIOs to connect to external EEPROM, secured isolated UART communication, cell diagnostic features, V_S 4.75 – 60 V, T_J -40 to 150°C	TQFP48 9x9	1
Isolated UART transceiver IC	UART interface	TLE9015DQU	UART transceiver IC with 2 non-isolated interfaces for MCU and 2 isolated interfaces for BMS Ics, 2 Mbps data rate, external fault inputs, latching error output pin, watchdog & wake-up function, V_S 4.75 – 45 V, T_J -40 to 150°C	TQFP48 9x9	1



- > V1.0 Original document
- > V1.1 Added overview, landing pages, and hyperlinks to all products in the tables
- > V1.2 Updated block diagram
- > V1.3 Retitled and removed wording of reference designs
- > V1.4 Adjusted colors
- V1.5 Updated content of ToF camera by pmd, links for Wi-Fi MCUs & motor controls, boards for motor control & connectivity, added charger boards



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