

User guide Config Wizard Tool for MOTIX[™] Multi MOSFET Driver ICs

About this document

Scope and purpose

This tool is a graphical user interface to control the motor control shields of Infineon's MOTIX[™] Multi MOSFET Driver ICs for TLE92108 EVALKIT, TLE92108 APPKIT and TLE92104 APPKIT, and to support parameter definition with TLE9210x GATE DRIVER SETTINGS or register design with TLE9210x Register Setting Tool.

Config Wizard for MOTIX[™] Multi MOSFET Driver ICs allows easy configuration of Automotive Multi MOSFET Driver IC products.

Intended audience

This document is addressed to embedded hardware and/or software developers which are familiar with motor control schemes and intend to evaluate the named ICs.



Table of contents

Table of contents

	About this document
	Table of contents
1	Introduction to Config Wizard for MOTIX [™] Multi MOSFET Driver ICs
1.1	Tool overview
1.2	Required hardware
1.3	Connections
1.4	Starting the tool
1.5	User guide and forum
2	GUI explanation
2.1	Open Config Wizard for MOTIX [™] Multi MOSFET Driver ICs for TLE92108 EVALKIT
2.2	Open Config Wizard for MOTIX [™] Multi MOSFET Driver ICs for TLE92108 APPKIT
2.3	Open Config Wizard for MOTIX ^{$^{ imes}$} Multi MOSFET Driver ICs for TLE92104 APPKIT \dots 9
2.4	Open Config Wizard for MOTIX [™] Multi MOSFET Driver ICs for TLE9210x GATE DRIVER
	SETTINGS
2.5	Open Config Wizard for MOTIX [®] Multi MOSFET Driver ICs for TLE92108 REGISTER SETTING
	TOOL
3	Getting started
3.1	Config Wizard for MOTIX [™] Multi MOSFET Driver ICs for TLE92108 EVALKIT
3.2	Config Wizard for MOTIX [™] Multi MOSFET Driver ICs for TLE92108 APPKIT
3.3	Config Wizard for MOTIX [™] Multi MOSFET Driver ICs for TLE92104 APPKIT
3.4	Config Wizard for MOTIX [™] Multi MOSFET Driver ICs for TLE9210x GATE DRIVER SETTINGS 20
3.4.1	Datasheet MOSFET parameters
3.4.2	Application conditions
3.4.3	Calculated MOSFET parameters
3.4.4	Calculated Output
3.5	Config Wizard for MOTIX [™] Multi MOSFET Driver ICs for TLE92108 Register Setting Tool24
4	Example of Config Wizard for MOTIX $^{ imes}$ Multi MOSFET Driver ICs configuration with
	TLE92108 EVALKIT
5	Disclaimer
	Revision history
	Disclaimer



1 Introduction to Config Wizard for MOTIX[™] Multi MOSFET Driver ICs

1 Introduction to Config Wizard for MOTIX[™] Multi MOSFET Driver ICs

1.1 Tool overview

The Config Wizard for MOTIX[™] Multi MOSFET Driver ICs is a tool within Infineon Developer Center and allows easy configuration of Multi MOSFET Driver IC products.

The download link and installation instructions can be found here

This tool consists of:

- TLE92108 EVALKT: a graphical user interface (GUI) to control Infineon's MOTIX[™] Multi MOSFET Driver ICs for TLE92108 EVALKIT
- TLE92108 APPKIT: a graphical user interface (GUI) to control Infineon's MOTIX[™] Multi MOSFET Driver ICs for TLE92108 APPKIT
- TLE92104 APPKIT: a graphical user interface (GUI) to control Infineon's MOTIX[™] Multi MOSFET Driver ICs for TLE92104 APPKIT
- TLE9210x GATE DRIVER SETTINGS: a calculator for the settings of the gate drivers for the DC Motor System ICs (TLE9210x)
- TLE92108 REGISTER SETTINGS: a graphical user interface (GUI) for register setting for TLE92108

1.2 Required hardware

µIO stick

μIO stick



Figure 1

TLE92108 Evaluation Board (EVALKIT) or TLE9210x Application Kit (APPKIT), see Figure 2 and Figure 3



1 Introduction to Config Wizard for MOTIX[™] Multi MOSFET Driver ICs





TLE92108 Evaluation Board







1 Introduction to Config Wizard for MOTIX[™] Multi MOSFET Driver ICs

- 12 V DC power supply, which is able to provide sufficient current for the motor load. For evaluation purpose motor loads with less than 10 A current consumption are recommended
- DC motor as load

1.3 Connections

Please prepare the set up as instructed:

- Connect the μ IO Stick to the device. Check the connection of cable to the 16-pin header. Red wire should be at the cable indicates pin 1
- Connect a motor as a load between the ports OUT1 and OUT2
- Connect the µIO Stick to a PC or a laptop through a free USB port
- Connect a 12V DC power supply to the ports VBAT and GND

Finally, connections are built, as is shown in Figure 4.



Figure 4

Test environment

1.4 Starting the tool

After successful installation of Config Wizard for MOTIX[™] Multi MOSFET Driver ICs, the installed tool can be found in the Infineon Developer Center Launcher. Click on the corresponding **Start** button to launch the tool.

User guide Config Wizard Tool for MOTIX[™] Multi MOSFET Driver ICs



1 Introduction to Config Wizard for MOTIX[™] Multi MOSFET Driver ICs

Start MOTIX™	
? 🛍	
Config Wizard for MOTI	
Config Wizard for MOTIX [™] Multi MOSFET Driver ICs	
Details	



Select the desired product and board from provided options in the tool.



2 GUI explanation



Figure 6

Product selection in the Config Wizard for MOTIX[™] Multi MOSFET Driver ICs

1.5 User guide and forum

Click on the question mark icon to open the user guide and find a GUI explanation, configuration examples, general information and recommendations here.



Click on the world icon to open the forum for MOTIX[™] Driver. In the forum you can find discussions on the products, gain access to the community as well as further information.

Figure 8 Accessing the forum

2 GUI explanation

2.1 Open Config Wizard for MOTIX[™] Multi MOSFET Driver ICs for TLE92108 EVALKIT

User guide Config Wizard Tool for MOTIX[™] Multi MOSFET Driver ICs



2 GUI explanation



Figure 9

Starting the GUI for the TLE92108 EVALKIT

The following view will be displayed. Refer to Config Wizard for MOTIX[™] Multi MOSFET Driver ICs for TLE92108 EVALKIT for further information on the configuration options.



Figure 10 Starting view of the GUI for the TLE92108 EVALKIT

2.2 Open Config Wizard for MOTIX[™] Multi MOSFET Driver ICs for TLE92108 APPKIT

User guide Config Wizard Tool for MOTIX[™] Multi MOSFET Driver ICs



2 GUI explanation



Figure 11 Starting the GUI for the TLE92108 APPKIT

The following view will be displayed. Refer to Config Wizard for MOTIX[™] Multi MOSFET Driver ICs for TLE92108 APPKIT for further information on the configuration options.



Figure 12 Starting view of the GUI for the TLE92108 APPKIT

2.3 Open Config Wizard for MOTIX[™] Multi MOSFET Driver ICs for TLE92104 APPKIT



2 GUI explanation



Figure 13 Starting the GUI for the TLE92104 APPKIT

The following view will be displayed. Refer to Config Wizard for MOTIX[™] Multi MOSFET Driver ICs for TLE92104 APPKIT for further information on the configuration options.



Figure 14 Starting view of the GUI for the TLE92104 APPKIT

2.4 Open Config Wizard for MOTIX[™] Multi MOSFET Driver ICs for TLE9210x GATE DRIVER SETTINGS

User guide Config Wizard Tool for MOTIX[™] Multi MOSFET Driver ICs



2 GUI explanation



Starting the GUI for the gate driver settings for the TLE9210x Figure 15

The following view will be displayed. Refer to Config Wizard for MOTIX[™] Multi MOSFET Driver ICs for TLE9210x GATE DRIVER SETTINGS for further information on the configuration options.



Starting view of the TLE9210x gate driver settings

Open Config Wizard for MOTIX[™] Multi MOSFET Driver ICs for 2.5 **TLE92108 REGISTER SETTING TOOL**





Figure 17 Starting the GUI for the register setting tool for the TLE92108

The following view will be displayed. Refer to Config Wizard for MOTIX[™] Multi MOSFET Driver ICs for TLE92108 Register Setting Tool for further information on the configuration options.

File	Extras													
Back to	o Device Selection													
evice Stat	tus													
) uIO St	tick connected			🥥 Target I	C accessable					Clear Diagnost	tic/Status Registe	rs	RES	ET
igister Se	election													
gister Do	omain:			Register:					0	Read				
TRL				GENCTRL1					• •	Write/Clear				
CSI [15] F	D2 CSAG2 R/W [1413] R/W	CSD1 [12] R/W		CSAG1 [1110] R/W	REG_BANK [9] R/W	VSOVTH [8] R/W	UNLOCK [7] R/W	reserved [6] R/O	FMODE [5] R/W	reserved [4] R/O	IPCHGADT [3] R/W	OCEN [2] R/W	WDPER [1] R/W	WDTRIG [0] R/W
Jnidirect 0b0)	tional 10 V/V (0b00)	Unidirectional (0b0)	10 V/V (0b0	00)	Bank 0 (0b0)	V_SOVOFF1	Cannot be reset (0b0)	0	No modulation (0b0)	0	1 current step (0b0)	Disabled (0b0)	50 ms (0b0)	0 (0b0)
egister Co	ompilation													
	Register													
		Address		W(1)/R(0)		Value		Delay [ms]		Answer		Comment	- Edit	
1		Address 0x00	1	W(1)/R(0)	0x00	Value 00	0	Delay [ms]		Answer		Comment		erwrite line
1 2		Address 0x00 0x00	1	W(1)/R(0)	0x00	Value 00	0	Delay [ms]		Answer		Comment		erwrite line Delete Line
1 2		Address 0x00 0x00 0x00 0x00	1	W(1)/R(0)	0x000	Value 00 00	0	Delay [ms]		Answer		Comment		erwrite line Delete Line Delete All
1 2 3 4		Address 0x00 0x00 0x00 0x00 0x00	1	W(1)/R(0)	0x000 0x000 0x000 0x000	Value 10 10 10	0 0 0 0 0 0	Delay [ms]		Answer		Comment		erwrite line Delete Line Delete All
1 2 3 4		Address 0x00 0x00 0x00 0x00 0x00 0x00 0x00	1 1 1 1 1	W(1)/R(0)	0x000 0x000 0x000 0x000 0x000	Value	0 0 0 0 0	Delay [ms]		Answer		Comment	-Edit- ₩ 0v -USB- USB- -USB- 	erwrite line Delete Line Delete All > SEND ugle-Step
1 2 3 4 5		Address 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	W(1)/R(0)	0x000 0x000 0x000 0x000 0x000	Value 10 10 10 10 10	0 0 0 0 0 0	Delay [ms]		Answer		Comment	▲ -Edit- Ø Ov USB- USB- Si Loop	erwrite line Delete Line Delete All> SEND igle-Step count 1
1 2 3 4 5 6		Address 0x00	1 1 1 1 1 1 1	W(1)/R(0)	0x000 0x000 0x000 0x000 0x000 0x000	Value	0 0 0 0 0 0 0	Deløy [ms]		Answer		Comment	Edit O	erwrite line Delete Line Delete All > SEND ggle-Step count 1
1 2 3 4 5 6 7		Address 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00	1 1 1 1 1 1 1 1 1 1	W(1)/R(0)	0x000 0x000 0x000 0x000 0x000 0x000 0x000	Value 10 10 10 10 10 10 10 10 10 10	0 0 0 0 0 0 0 0	Deløy [ms]		Answer		Comment		erwrite line Delete Line Delete All > SEND ngle-Step Load
1 2 3 4 5 6 7 8		Address 0x00 0x00	1 1 1 1 1 1 1 1 1 1 1	W(1)/R(0)	0x000 0x000 0x000 0x000 0x000 0x000 0x000 0x000	Value 00 00 00 00 00 00	0 0 0 0 0 0 0 0 0 0 0	Delay [ms]		Answer		Comment		erwrite line Delete Line Delete All > SEND orgle-Step count 1 Load Partial Load

Figure 18Starting view of the TLE92108 register setting tool

3 Getting started

3.1 Config Wizard for MOTIX[™] Multi MOSFET Driver ICs for TLE92108 EVALKIT

USB Status LED:

Green: indicates that the communication between the μIO stick and the TLE92108-23QX is working

Red: indicates that the communication is not working

Clear diagnostic/status registers:

all of the diagnostic/status register should be cleared

Reset:

reset the graphic user interface and of the TLE92108 device (EN pin is toggled resulting in a device power-on reset)







Motor 1/2/3/4/5:

Select motor and define state and half bridge settings

Ext. PWM generation via µIO-stick:

Define PWM duty cycle and frequency

PWM signal mapping:

Map PWM channel to specific half bridge

PWM mapping error:

LED lights showing error in PWM channel

Off-state diagnose:

Enable PD current and check HBxVOUT status bits from LED

General status:

LED lights showing state of general status register

Current sense amp. (CSA):

CSA selection: CSA1 or CSA2

Define R_{shunt} value

Enable/disable CSA1 and CSA2

Global status:

LED lights showing global status byte





Figure 20 TLE92108 EVALKIT motor control panel and details

Detailed settings:

Configure general control parameters, bridge driver passive settings, current sense specifications and gate driver parameters

Set thresholds, blank time and charge/discharge current for each HB

	10					
8 Status: 🤤 Clear Dia	agnostic/Status Registers	RESET	Bridge Driver active	•	DIAGNOSTIC READ	
tor Control Detailed Settings PWM and Diagnost	ic					
Jure	Velue		Structure	Value	▲	
- Frequency Modulation enable	Ø		Drain-source O/ Threshold Calculation	UN = VICENT - VEHT		
- VS OV Threshold	min. 19 V	*				
CP Undervoltage Threshold	7.5 V	*	Drain-source Overvoltage Threshold	0.25 V		
Enable auto. CP single/dual stage operation			CCP and Blank Time Selection	CCP Time 1 / Blank Time 1		
- Mask TD Regulation			- Static Charge/Dischage Current Selection	Current 1		
Mode selection LS1-4	ON if VS > Vsov pass off	*	Half Bridge 2			
VDS mon. ON			Drain-source OV Threshold Calculation	Vth = VCSIN1 - VSH2		
Current Sense			- Drain-source Overvoltage Threshold	0.20 V		
CSO capacitor	lover than 100pf	*	CCR and Rinek Time Selection	COR Town 1 / Black Town 1		
Enable overcurrent shutdown CSA1 Settings	M					
E CSA2 Settings late Driver			- Static Charge/Dischage Current Selection	Current 1		
Postcharge	×		 Part tridge a Design course Of Threshold Calculation 	10 - 10000 - 1000		
tccp_active PW CCP Times 1-4 tccp_fw: PW CCP Times 1-4				101-1021-1010		
tblank_active: Active Blank Time 1-4 tblank for: FW Blank Time 1-4			Drain-source Overvoltage Threshold	0.20 V		
- Drain Source Monitoring Filter Time	1 us	×	CCP and Blank Time Selection	CCP Time 1 / Blank Time 1		
- Hold Charpa/Discharpa Currant	12.5 mb / 14.2 mb		- Static Charge/Dischage Current Selection	Current 1		
			Half Bridge 4			
Static Charge/Discharge Current 1	76.8 mA / 78.5 mA	•	Drain-source OV Threshold Calculation	Vth = VCSIN1 - VSH4		
Static Charge/Discharge Current 2	76.8 mA / 78.5 mA	-	- Drain-source Overvoltage Threshold	0.20 V 🔻		
			CCD and Blank Time Salartion	CO2 Time 1 / Nank Time 1		
			- Static Charge/Dischage Current Selection	Current 1		
			Har proge 5	10 - 10 × 10 ×		
			Distribute ov mesido catoleter	101 - 101 - 1313		
			Drain-source Overvoltage Threshold	0.20 V		
			CCP and Blank Time Selection	CCP Time 1 / Blank Time 1		
			- Static Charge/Dischage Current Selection	Current 1		
			Half Bridge 6			
			Drain-source OV Threshold Calculation	Vth = VDH - VSH6		
			- Drain-source Overvoltage Threshold	0.20 V		
			CCD and Black Time Selection	COLUMN 1 / Rest Town 1		
			- Static Charge/Dischage Current Selection	Current 1	•	

Figure 21 TLE92108 EVALKIT detailed settings panel

PWM and diagnostic:

Set detailed information of PWM

Display PWM switching characteristics in real time



Display global status byte, general status register, PWM mapping error and drain-source over-voltage error



Figure 22 TLE92108 EVALKIT PWM and diagnostic pane

3.2 Config Wizard for MOTIX[™] Multi MOSFET Driver ICs for TLE92108 APPKIT

USB Status LED:

Green: indicates that the communication between the μ IO stick and the TLE92108-23QX is working

Red: indicates that the communication not working

Clear Diagnostic/Status Registers:

All of the diagnostic/status register should be cleared

Reset:

Reset the graphic user interface and of the TLE92108 device (EN pin is toggled resulting in a device power-on reset)

Motor 1/2/3/4:

Select motor and define state and half bridge settings

Ext. PWM generation via μ IO-stick:

Define PWM duty cycle and frequency

PWM signal mapping:

Map PWM channel to specific half bridge

PWM mapping error:

LED lights showing error in PWM channel

Off-state diagnose:

Enable PD current and check HBxVOUT status bits from LED

General status:

LED lights showing state of general status register

Current sense amp. (CSA):



CSA selection: CSA1 or CSA2 Define *R*_{shunt} value Enable/disable CSA1 and CSA2 Global status: LED lights showing global status byte



Figure 23 TLE92108 APPKIT motor control panel

Detailed settings:

Configure general control parameters, bridge driver passive settings, current sense specifications and gate driver parameters

Set thresholds, blank time and charge/discharge current for each HB



HIE EXTERS						
Status: 🥥 Clear Diagnostic	/Status Registers	RESET	Bridge Driver active	•	DIAGNOSTIC READ	
or Control Detailed Settings PWM and Diagnosti	c					
un	Value		2ruture	Value		
eneral Free anon Modulation enable	2		Half Bridge 1			
- VS OV Threshold	min. 19 V	•	Drain-source OV Threshold Calculation	Vth = VCSDN1 - VSH1	×	
- CP Undervoltage Threshold	7.5 V	v	Drain-source Overvoltage Threshold	0.20 V	•	
- Enable auto. CP single/dual stage operation			CCP and Blank Time Selection	CCP Time 1 / Blank Time 1	v	
- Mask ID Regulation dge driver passive settings			Static Charge/Dischage Current Selection	Current 1	•	
Mode selection LS1-4	ON IFVS > Vsov pass off	•	Half Bridge 2			
VDS mon. ON rent Sense	V		- Drain-source UV Inteshold Calculation	Vith = VCS2H2 - VSH2		
CSO capacitor	lower than 100pf	-	Drain-source Overvoltage Threshold	0.20 V		
Enable overcurrent shutdown CSA1 Settings	V		CCP and Blank Time Selection	CCP Time 1 / Blenk Time 1	×	
CSA2 Settings			- Static Charge/Dischage Current Selection	Current 1	v	
Postcharge	Y		Hair bridge 3 Drain-source OV Threshold Calculation	Ves = VPSRd - VSH3	•	
tccp_fir: PW CCP Times 1-4			- Depis course Quanalman Threshold	0.70 /		
tblank_sky: FW Blank Time 1-4						
Drain Source Monitoring Filter Time	1.0	*		CDP Time 1 / Blenk Time 1		
Hold Charge/Discharge Current	12.5 mA / 14.2 mA	•	Static Charge/Dischage Current Selection	Current 1	•	
Static Charge/Discharge Current 1	76.8 mA / 78.5 mA	Υ.	Drain-source OV Threshold Calculation	Vth = VCS2H1 - VSH4	*	
Static Charge/Discharge Current 2	76.8 mA / 78.5 mA	-	Drain-source Overvoltage Threshold	9.29 V	T	
			CCP and Blank Time Selection	CCP Ture 1 / Bleck Ture 1		
			- Static Channel/Dischange Current Selection	Commit 1		
			Half Bridge 5	CUMPLE S		
			- Drain-source OV Threshold Calculation	Vbi = VDH - VSHS	v	
			- Drain-source Overvoltage Threshold	0.20 V	•	
			CCP and Blank Time Selection	CCP Time 1 / Blenk Time 1	v	
			- Static Charge/Dischage Current Selection	Current 1	T	
			Half Bridge 6			
			Drain-source OV Threshold Calculation	Vth = VDH - VSH6	•	
			Drain-source Overvoltage Threshold	0.20 V	×	
			CCP and Blank Time Selection	CCP Time 1 / Blank Time 1	v	
			- Static Charge/Dischage Current Selection	Current 1	•	
			Half Bridge 7			

Figure 24

TLE92108 APPKIT detailed settings panel

PWM and diagnostic:

Set detailed information of PWM

Display PWM switching characteristics in real time

Display global status byte, general status register, PWM mapping error and drain-source over-voltage error

Image: Control

Figure 25

TLE92108 APPKIT PWM and diagnostic panel



3.3 Config Wizard for MOTIX[™] Multi MOSFET Driver ICs for TLE92104 APPKIT

USB status LED:

Green: indicates that the communication between the μIO stick and the TLE92104-23QX is working

Red: indicates that the communication not working

Clear diagnostic/status registers:

All of the diagnostic/status register should be cleared

Reset:

Reset the graphic user interface and of the TLE92104 device (EN pin is toggled resulting in a device power-on reset)

Motor 1/2:

Select motor and define state and half bridge settings

Ext. PWM generation via µIO-Stick:

Define PWM duty cycle and frequency

PWM signal mapping:

Map PWM channel to specific half bridge

PWM mapping error:

LED lights showing error in PWM channel

Off-state diagnose:

Enable PD current and check HBxVOUT status bits from LED

General status:

LED lights showing state of general status register

Current sense amp. (CSA):

CSA selection: CSA1 or CSA2

Define R_{Bshunt} value

Enable/disable CSA1 and CSA2

Global status:

LED lights showing global status byte



Infineon Developer Center Config Wizard for MOTIX TM Multi MOSFET Driver ICs File Extras						
Back to Device Selection Status: Olear Diagnostic/Status Registers	RESET	Bridge Driver	active	⊖ Dia	IGNOSTIC READ	
tor Control Detailed Settings PWM and Diagnostic	Motor 1	Motor 2		- Motor 2	Current Sense Amp. (CSA)	
vs P	E High Imped.	vs P		🗄 High Imped.	CSA Selection 🖲 1 🛄 2	
	HS1/LS2 on		2	HS3/LS4 on	Current Vosox = 0V	
	LS1/HS2 on	HS3 HS4	SH4	L\$3/H\$4 on	KHUNT 4.70 mOlim +	
	Break Low	LS3 LS4	E	🛙 Break Low	Celc Current: -21.28 A	
	🗋 Break High			🗋 Break High	🗹 CS41 m 🕑 CS42 m	
PWM Signal Mapping	PWM Mapping Error	Off-State Diagnose		- General Status	Global Status	
PIIM 1 Duty C. 20 % * DVM 1 mapped to H81	→ Hat			○ PWN3 ○ TW ○ PWN2 ○ 0C2	tai Safe Thermal Error	
PIIM 2 Duty C. 50 % * PIIM 2 mapped to H82	• — на	H01 H02	H83 H84	○ PWH1 ○ 0C1	Neg. POR	
PIIM 3 Duby C. 50 % *	- наз	Enable PD current	• •	TOREG2	 Supply three VOS Errer 	
цику 2000 Hz <u>т</u>	H84			TOREGI TSD TOREGI VSUV VSUV CPUV	Oversument SP1 Droor	
		J]	

Figure 26 TLE92104 APPKIT motor control panel

Detailed settings:

Configure general control parameters, bridge driver passive settings, current sense specifications and gate driver parameters

Set thresholds, blank time and charge/discharge current for each HB

Figure 27 TLE92104 APPKIT detailed settings panel

PWM and diagnostic:

Set detailed information of PWM

Display PWM switching characteristics in real time



Display global status byte, general status register, PWM mapping error and drain-source overvoltage error

Back to Device Selection Status: O Clear Diagnostic/Status Registers	RESET	Bridge Driver active	9	DIAGNOSTIC READ)	•
tor Control Detailed Setting PMM and Diagnosis	ga afondad y	PMM Southing PMM Southing PMM Southing PMM Co.1 PMM Co.2 PMM Co.3 Obded Status Image: Status	g Characteristics contractor 2566 2566 2566 2566 2566 2566 0 7002 0 700 0 7002 0 7002	Eff.TDON Eff.TDON Eff.TDON Ons Ons Ons Ons Ons <t< th=""><th>ERTRISE ERTTALL Ges Ons Ges Ons Ges Ons Des Source Denvoluges Ges Ca Ges Ca Ges</th><th></th></t<>	ERTRISE ERTTALL Ges Ons Ges Ons Ges Ons Des Source Denvoluges Ges Ca Ges	

Figure 28 TLE92104 APPKIT PWM and diagnostic panel

3.4 Config Wizard for MOTIX[™] Multi MOSFET Driver ICs for TLE9210x GATE DRIVER SETTINGS

3.4.1 Datasheet MOSFET parameters

Configure parameters of MOSFET to be controlled by the MOSFET driver in this section.

Table 1List of MOSFET input parameters

Abbreviation	Definition	Unit	Comment
Qgs_typ	Typical MOSFET gate- source charge	nC	According to the datasheet conditions
Qgd_typ	Typical MOSFET gate- drain charge	nC	According to the datasheet conditions
Qg_typ	Typical MOSFET total gate charge	nC	According to the datasheet conditions (in general @Vgs = 10 V)
Vdd_typ	Vds at which Qgd_typ is specified	V	e.g. For IPZ40N04S5-3R1: Vdd_typ = 32 V
Vgh_typ	Vgs at which Qg_typ is specified for full turn-on	V	e.g. For IPZ40N04S5-3R1: Vgh_typ = 10 V
Vplateau_typ	Vgs plateau at which Qgs_typ is specified	V	For IPZ40N04S5-3R1: Vplateau_typ=4.4 V @ Ids=40A

(table continues...)



3 Getting started

Table 1	(continued) List of MOSFET input		
Abbreviation	Definition	Unit	Comment
Vgs_th	Vgs threshold according to the typical application conditions (Ids, etc)	V	According to the datasheet conditions
Ciss_vs	MOSFET input capacitance for drain- source voltage with Vds = Vs	pF	Corresponding to the nominal application conditions (Vs = 14 V in this application note)
Crss_vs	MOSFET reverse transfer capacitance with Vds = Vs	pF	
Crss_typ	MOSFET reverse transfer capacitance at Vds = Vdd_typ	pF	

Application conditions 3.4.2

This section specifies the application parameters: voltage level, timing and adaptive gate control. For detailed information of each parameter, please check Table 2.

Table 2	List of input paramete	rs in the application conditions
---------	------------------------	----------------------------------

Abbreviation	Definition	Unit	Comment
Vs	Nominal application supply voltage	V	Vs = 14 V in this document
Vgh	MOSFET driver gate- source voltage when the gate is fully charged	V	
Vplateau	Vgs plateau in the application conditions	V	
trise_target	Active MOSFET target rise time	ns	
tfall_target	Active MOSFET target fall time	ns	
toff_fw_target	FW MOSFET target turn- off time	ns	
tdon_min_margin	Additional delay between the end of the pre-charge phase and the moment when Vgs reaches Vgs_th	ns	300 ns in the examples
tdoff_min_margin	Additional delay between the end of the pre- discharge phase and the moment when Vds decreases (Vgs reaches Vplateau)	ns	300 ns in the examples



Table 2	Table 2 (continued) List of input parameters in the application conditions									
Abbreviation	Definition	Unit	Comment							
t_margin	Margin in % added to the min. required cross- current protection time and blank time	%	30 % in the examples							
tpchg	Gate driver pre-charge time	ns	TPRECHG register							
tpdchg	Gate driver pre-discharge time	ns	TPRECHG register							
AGC	Adaptive gate control bit		GENTCTRL register							

Table 2 (continued) list of input never stars in the application conditions

Calculated MOSFET parameters 3.4.3

This section displays calculated parameters with given MOSFET parameters. As is shown in Figure 29.

Calculated MOSF	Calculated MOSFET parameters:				
Qgs	7.308	nC			
Qgd	5.885	nC			
Qg	33	nC			
Ciss_0V	2893	pF			

Figure 29 **Calculated MOSFET parameters**

Qg, Qgd, Qg are required parameters for the control of the switching times of the active MOSFET. Refer to Figure 30 for the definition.

These parameters depend on the working point of the active MOSFET. Indeed, these gate charges vary (among others) with:

- The applied drain-source voltage •
- The MOSFET Ids current
- The applied gate-source voltage, when the MOSFET is turned on (Vgh) •





Figure 30 Definition of gate charge

For a more accurate control of the switching times, the gate charges must be adapted to the specific application conditions.

Ciss_vs is the input capacitance under the following conditions: Vds = Vs and Vgs = 0 V.Ciss_vs is needed to set conditions on the gate driver configurations for the pre-charge phase (AGC = 1 or 2), in order to avoid a too fast current increase of Ids (i.e. high dI_{ds} / dt) during the turn-on of the MOSFET.

3.4.4 Calculated Output

Curves showing the switching of MOSFET with given MOSFET parameters and application settings

For details of this calculation tool, please check the application note 'Step-by-step MOSFET driver setting guide and calculator description'.

tRISE: is the target rise time of the active MOSFET. This parameter is defined as the duration of the Vds slope at the turn-on of the active MOSFET (refer to Figure 31).

tFALL: is the target fall time of the active MOSFET. This parameter is defined as the duration of the Vds slope at the turn-off of the active MOSFET (refer to Figure 31).

tDON: is the turn-on delay time.

tDOFF: is the turn-off delay time.

toff_fw: is the target switch-off time of the FW MOSFET.

ton_fw: is the target switch-on time of the FW MOSFET.

tCCP_ACTIVE: is the cross-current protection time of the active MOSFET. The gate driver must be configured so that active MOSFET is off before the end of the tCCP_ACTIVE

tCCP_FW: is the cross-current protection time of the FW MOSFET. The gate driver must be configured so that the FW MOSFET is off before the end of the tCCP_FW.

tBLANK_ACTIVE: is the blank time of the active MOSFET.

tBLANK_FW: is the blank time of the FW MOSFET.







Config Wizard for MOTIX[™] Multi MOSFET Driver ICs for TLE9210x gate driver settings panel

3.5 Config Wizard for MOTIX[™] Multi MOSFET Driver ICs for TLE92108 Register Setting Tool

 μIO stick connected LED:

Green: indicates that the communication between the μIO stick and the TLE92108-23QX is working

Red: indicates that the communication not working

Target IC accessable:

The device is accessable and ready for read or write

Clear diagnostic/status registers:

Clear all status registers

RESET:

Reset the graphic user interface and of the TLE92108 device (EN pin is toggled resulting in a device power-on reset)

Register domain:

Set the domain of register (CTRL register or STAT register) to be written or read

Register:

Set the register of specific register domain to be written or read

Read:

Read the value from selected register

Write/clear:

Write or clear the value in selected register

Right arrow:

Write the defined value to a temporary list

Left arrow:



4 Example of Config Wizard for MOTIX[™] Multi MOSFET Driver ICs configuration with TLE92108 EVALKIT

Read the register value from a loaded list
Overwrite line:
Overwrite the lines in the list from selected line onwards
Delete Line:
Delete the selected line in the list
Delete all:
Delete all of the selected lines in the list
SEND:
Send the list of settings to the device
Single-step:
Execute the settings in the list line by line
Loop count:
Define how many times the settings in the list should be repeated
Load:
Load settings from an existing file
Partial load:
Load the setting partially from an existing file
Save:
Save the settings to an .icwp file

Export:

Export register settings to a .c file

٢	Developer Center Config Wizard for MOTIX TM Multi MOSFET Driver ICs																				
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Figure 32

TLE92108 Register Setting Tool control panel

4

Example of Config Wizard for MOTIX[™] Multi MOSFET Driver ICs configuration with TLE92108 EVALKIT

The motor implemented for this test is a 12 V brush DC motor with 2 pole pairs. This motor features with high speed of rotation and large moment of force, which is 1 Kgf.cm. The motor is powered with a 12 V DC voltage source. At this voltage level, the rated speed of the motor is 3500 RPM, and the rated power is 30 W.



4 Example of Config Wizard for MOTIX[™] Multi MOSFET Driver ICs configuration with TLE92108 EVALKIT

As is shown in Figure 33, half bridge 1 and half bridge 2 are enabled, where LS1 is the active MOSFET controlled by PWM1 with a defined duty cycle. In this case, HS1 is the freewheeling MOSFET. All other configurations are from default settings defined in Config Wizard for MOTIX[™] Multi MOSFET Driver ICs provided as reference. Please note thath the Config Wizard for MOTIX[™] Multi MOSFET Driver ICs pre-configures the control registers of TLE92108/4 and optimized the settings for the IPZ40N04S5-3R1 MOSFET.



Figure 33 Configuration with LS1/HS2 on and PWM1 mapped to HB1

To better understand the switching behavior of the device, following pins of EVALKIT are measured:

- PWM1: PWM signal applied to PWM 1
- *V*_{GLS1}: voltage of low side 1 gate
- *V*_{SH1}: voltage of junction point between high side 1 and low side 1
- *I*_G : gate current of low side 1

As is shown in Figure 34, the gate driver is switched on and off with the control of PWM signal.

User guide Config Wizard Tool for MOTIX[™] Multi MOSFET Driver ICs



5 Disclaimer





Overview of measurement result with default configuration

5 Disclaimer

Config Wizard for MOTIX[™] Multi MOSFET Driver ICs is based in part on the work of the Qwt project (http:// qwt.sf.net).

The following LGPL/GPLv3 are used in our software and can be found in the license folder:

- QuaZip
- qt 5.12.2
- libiconv 1.14
- PythonQt

Revision history

Document Date of C version release		Description of changes					
01.10	2022-09-30	Graphical user interface (GUI) for TLE92108 Register Settings added					
01.00	2022-06-03	Initial document release					

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