

Migration Path from TC1767 to TC1782

May 2010

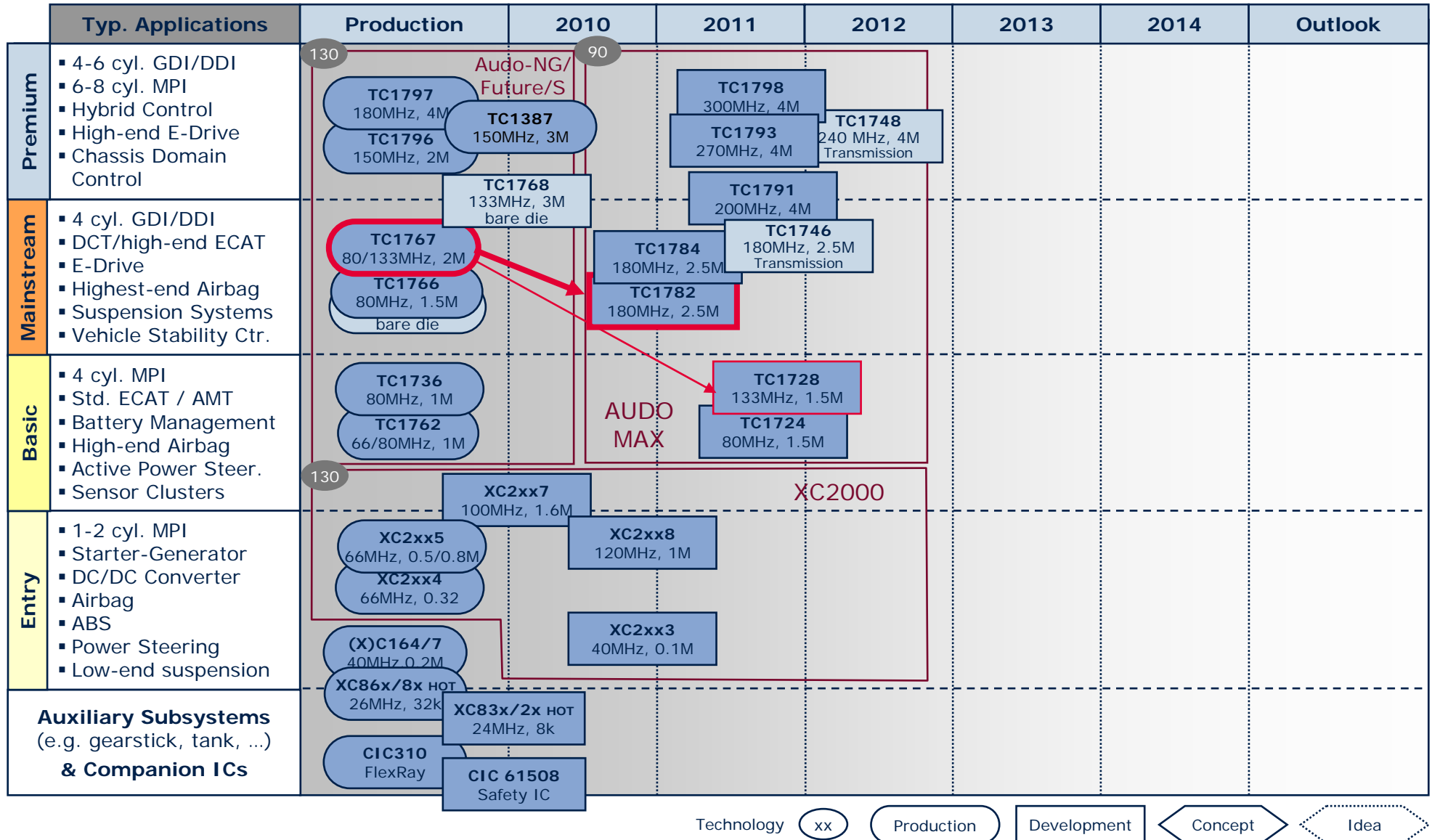
V1.2



Never stop thinking


Powertrain/Safety Microcontroller Roadmap



May 2010



AUDO MAX Overview

May 2010



4 MB			TC1791 200 MHz	TC1793 270 MHz	TC1798 300 MHz	TC1748 240 MHz
2.5 MB		TC1782 180 MHz	TC1784 180 MHz			TC1746 180 MHz
1.5 MB	TC1724 80 MHz	TC1728 133 MHz				
	LQFP 144	LQFP 176	LFBGA 292	LBGA 416	LFBGA 516	Bare Die

Frequency and Flash size are maximum values. Customer specific variants with lower values possible.

AUDO MAX Overview

May 2010




4 MB			TC1791 200 MHz	TC1793 260 MHz	TC1798 300 MHz	TC1748 240 MHz
2.5 MB		TC1782 180 MHz	TC1784 180 MHz			TC1746 180 MHz
1.5 MB	TC1724 80 MHz	TC1728 133 MHz				
	LQFP 144	LQFP 176	LFBGA 292	LBGA 416	LFBGA 516	Bare Die

Frequency and Flash size are maximum values. Customer specific variants with lower values possible.

AUDO MAX Overview: TC1728/TC1724 MAY 2010




1.5 MB	TC1724F 80 MHz	TC1728F 133 MHz
1.0 MB	TC1724 80 MHz	
	LQFP 144	LQFP 176



 Samples available

F FlexRay (optional)

AUDO MAX Overview

May 2010

4 MB			TC1791 200 MHz	TC1793 260 MHz	TC1798 300 MHz	TC1748 240 MHz
2.5 MB		TC1782 180 MHz	TC1784 180 MHz			TC1746 180 MHz
1.5 MB	TC1724 80 MHz	TC1728 133 MHz				
	LQFP 144	LQFP 176	LFBGA 292	LBGA 416	LFBGA 516	Bare Die


Frequency and Flash size are maximum values. Customer specific variants with lower values possible.

AUDO MAX Overview: TC1784/TC1782/TC1746 May 2010



2.5 MB	TC1782F 180 MHz	TC1784F 180 MHz	TC1746F 180 MHz
2.0 MB	TC1782F 133 MHz		
	LQFP 176	LFBGA 292	Bare Die

 Samples available

 In preparation (Early Engineering samples Oct 2010)

F FlexRay (optional)

AUDO MAX Feature Overview (1/2)

May 2010



		TC1784	TC1782	TC1728	TC1724
Core	TC version	1.3.1	1.3.1	1.3.1	1.3.1
	Frequency	180 MHz	180MHz	133 MHz	80 MHz
Flash	Program Flash	2.5 MB	2.5 MB	1.5 MB	1.5 MB
	Data Flash (w/e cyc.)	128 KB (up to 60k)	128 KB (up to 60k)	32 KB (up to 60k)	32 KB (up to 60k)
SRAM	Σ (w/o PCP, Cache)	176 KB	176 KB	112 KB	112 KB
	PMI	40 KB	40 KB	16 KB	16 KB
	DMI	128 KB	128 KB	88 KB	88 KB
	Overlay	8 KB	8 KB	8 KB	8 KB
PCP (max. frequency)		180 MHz	180 MHz	133 MHz	80 MHz
DMA	Channels	16	16	16	16
ADC	Σ Analog Inputs	36	36	36	24
	ADC Channels	2 x 16	2 x 16	2 x 16	2 x 12
	FADC Channels	4	4	2	2
Timer	GPTA® / LTC	1 / 1	1 / 1	1 / -	1 / -
	CCU6 / GPT12	- / -	- / -	2 / 2	2 / 2
Interfaces	Flexray (node s/ ch.)	1 / 2 (optional)	1 / 2 (optional)	1 / 2 (optional)	1 / 2 (optional)
	CAN (nodes / objects)	3 / 128	3 / 128	3 / 64	2 / 64
	SSC / ASC / SENT	3 / 2 / -	3 / 2 / -	4 / 2 / -	1 / 2 / -
	MLI / MSC / EBU	1 / 1 / 1	1 / 1 / -	1 / 1 / -	0 / 1 / -
Safety	HW support	degree 1	degree 1	degree 3	degree 3
Security	SHE / Tuning Protection	- / yes	- / yes	- / yes	- / yes
Package		LFBGA 292	LQFP 176, ePAD	LQFP 176, ePAD	LQFP 144, ePAD
Temperature (T_{ambient})		- 40°C to +125°C	- 40°C to +125°C	- 40°C to +125°C	- 40°C to +125°C
EVR		-	-	yes	yes

AUDO MAX Overview

May 2010



4 MB			TC1791 200 MHz	TC1793 270 MHz	TC1798 300 MHz	TC1748 240 MHz
2.5 MB		TC1782 180 MHz	TC1784 180 MHz			TC1746 180 MHz
1.5 MB	TC1724 80 MHz	TC1728 133 MHz				
	LQFP 144	LQFP 176	LFBGA 292	LBGA 416	LFBGA 516	Bare Die

Frequency and Flash size are maximum values. Customer specific variants with lower values possible.

AUDO MAX Overview:

TC1798/TC1793/TC1791/TC1748

May 2010



4.0 MB	TC1791 240 MHz	TC1793 270/200MHz	TC1798 300/240MHz	TC1748 240 MHz
3.0 MB	TC1791 200 MHz	TC1793 200MHz		
	LFBGA 292	LBGA 416	LFBGA 516	Bare Die

AUDO MAX Feature Overview (2/2)

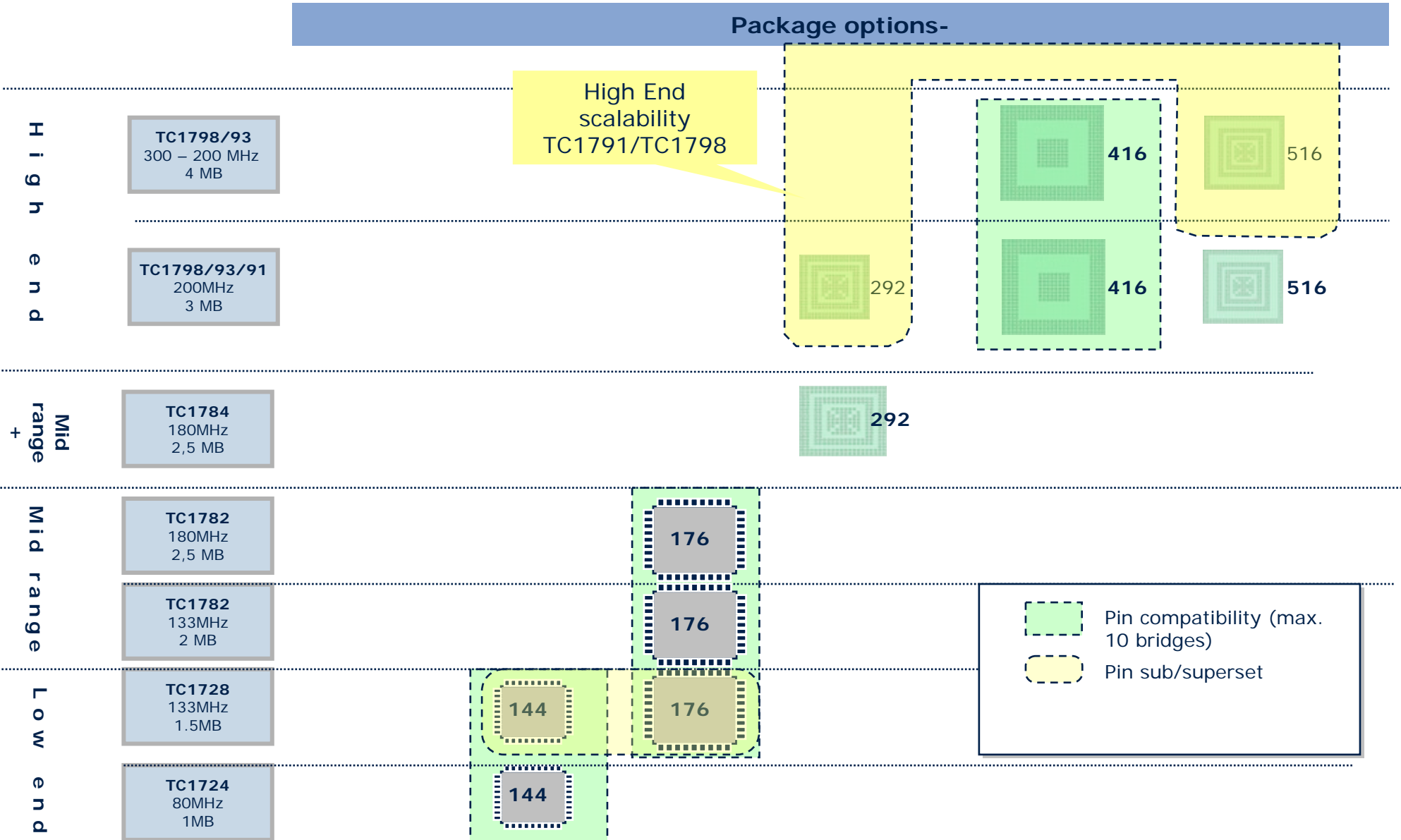
May 2010



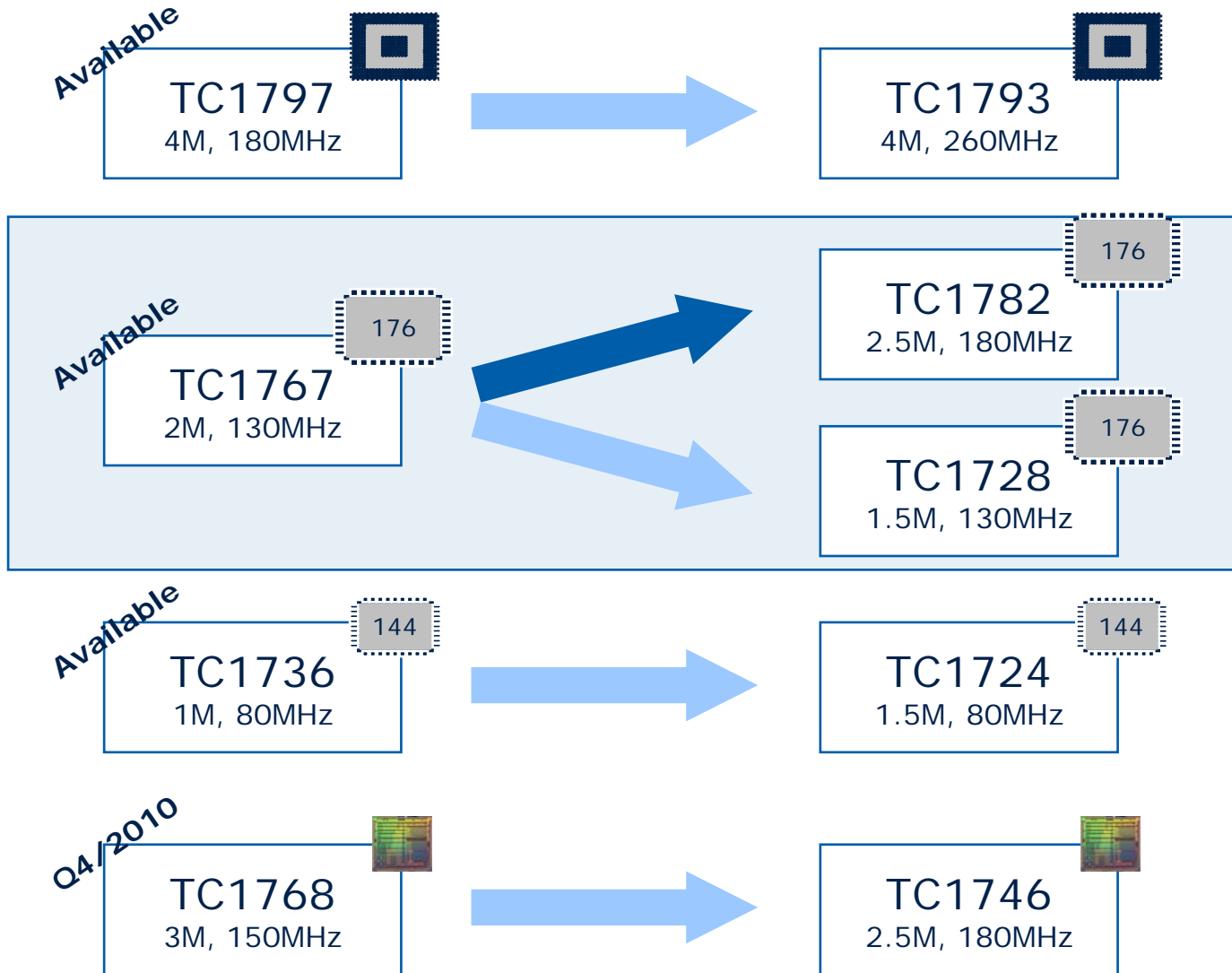
		TC1798	TC1793	TC1791
Core	TC version	1.6	1.6	1.6
	Frequency	300 MHz	270 MHz	200 MHz
Flash	Program Flash	4 MB	4 MB	4MB
	Data Flash (w/e cycl.)	192 KB (up to 60k)	192 KB (up to 60k)	192 KB (up to 60k)
SRAM	Σ (w/o PCP, Cache)	288 KB	288 KB	288 KB
	PMI	32 KB (+16 KB Icache)	32 KB (+16 KB Icache)	32 KB (+16 KB Icache)
	DMI	128 KB (+16 KB Dcache) + 128 KB on SRI	128 KB (+16 KB Dcache) + 128 KB on SRI	128 KB (+16 KB Dcache) + 128 KB on SRI
	Overlay	8 KB (in LMU)	8 KB (in LMU)	8 KB (in LMU)
PCP (max. frequency)		200 MHz	180 MHz	200 MHz
DMA	Channels	24	24	24
ADC	Σ Analog Inputs	72	44	48
	ADC Channels	4 x 16	3 x 16	3 x 16
	FADC Channels	4	4	4
Timer	GPTA® / LTC	2 / 1	2 / 1	2 / 1
	CCU6 / GPT12	4 / 2	4 / 2	4 / 2
Interfaces	Flexray (nodes / ch.)	1 / 2	1 / 2	1 / 2
	CAN (nodes / objects)	4 / 128	4 / 128	4 / 128
	SSC / ASC / SENT	4 / 2 / 8	4 / 2 / 8	3 / 2 / 8
	MLI / MSC / EBU	2 / 2 / 1	2 / 2 / 1	2 / 2 / -
Safety	HW support	degree 4	degree 4	degree 4
Security	SHE / Tuning Protection	Optional / yes	Optional / yes	Optional / yes
Package		LFBGA 516	LBGA 416	LFBGA 292
Temperature (T_{ambient})		- 40°C to +125°C	- 40°C to +125°C	- 40°C to +125°C
EVR		No	No	No

Scalability AUDO MAX family

Status: May 2010



Upgrade Paths / Backward Compatibility



TC1767 to TC1782

Additional Features

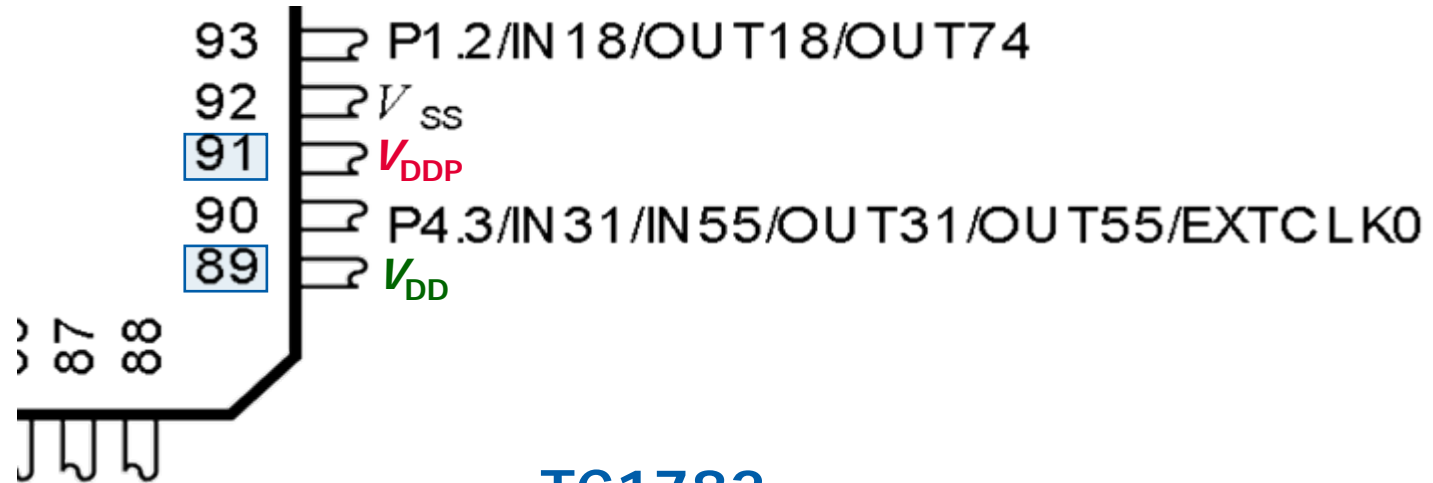
- 90nm (Core voltage 1.3V)
- Performance: 180MHz (+50MHz)
- SRAM size
 - Size: 176KB (+72KB)
 - ECC
- Program Flash: 2.5 MB (+0.5MB)
- Data Flash
 - endurance: 60k (+30K)
- FlexRay
- Addition SPI and CAN nodes
- Additional security features

Compatibility

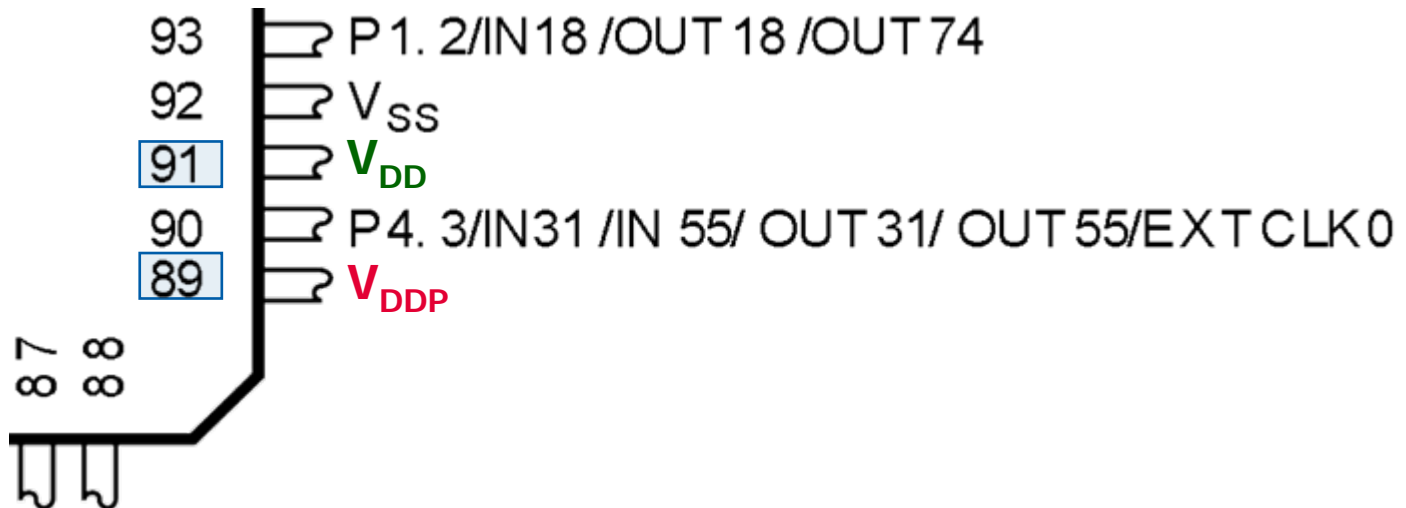
- Same system architecture
- Very good pin out compatibility
- Same core (V1.3.1)
- Compatible peripherals
 - GPTA/LTC
 - ADC/FADC
 - SSC/ASC
 - CAN
 - MLI/MSC
- **Limitations**
 - 1.3 V core supply (90nm)
 - 2 swapped pins (VDD/VDDP)

Pin Compatibility (2-power pins are swapped)

TC1767

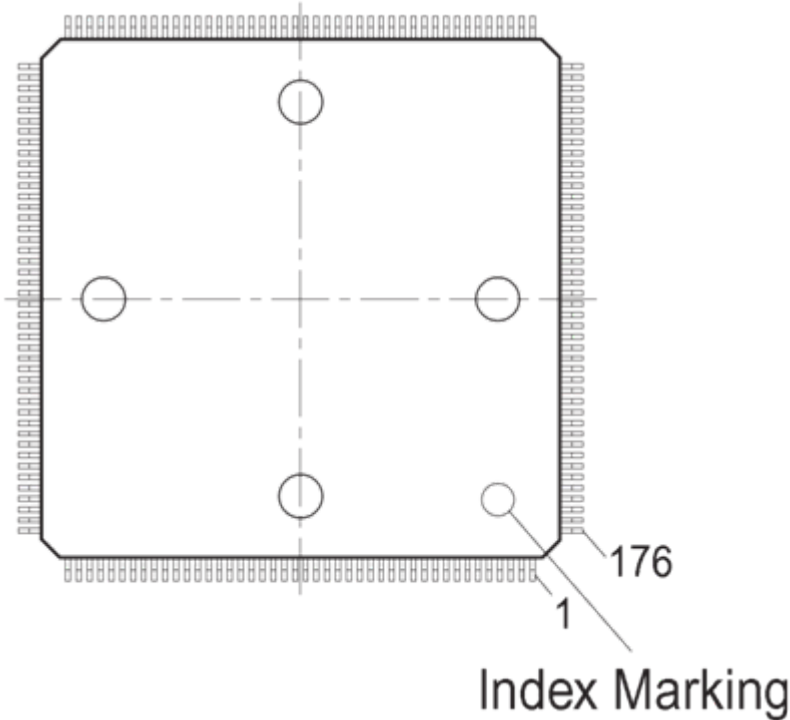


TC1782

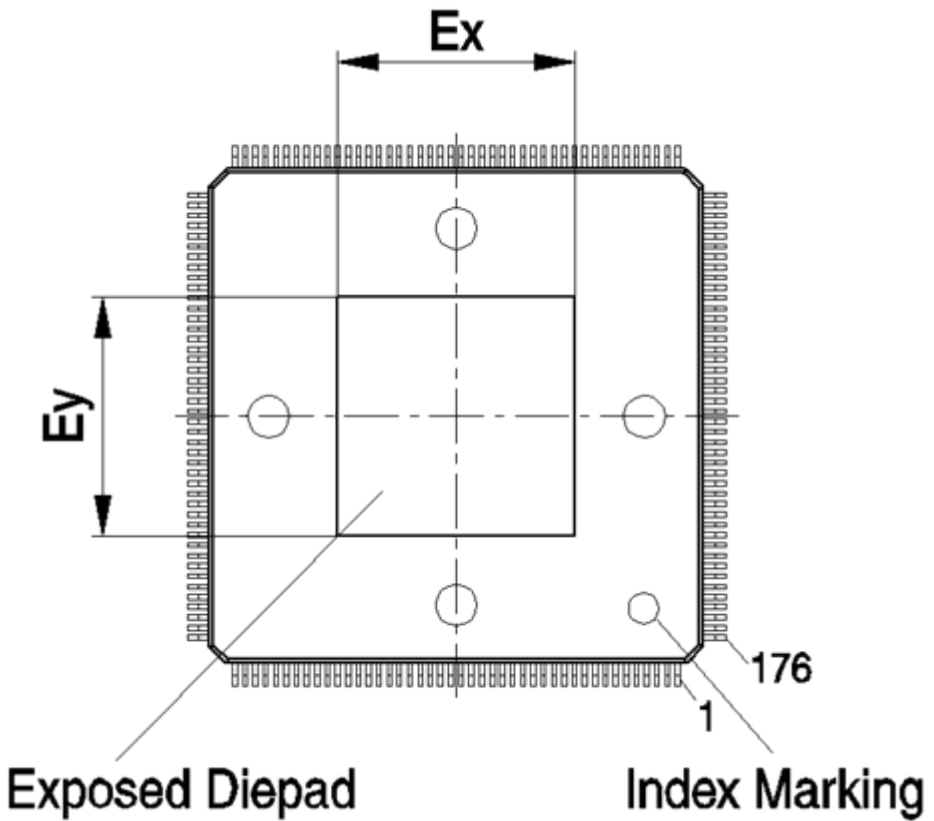


Package (LQFP-176)

TC1767



TC1782



R_{th} Values TC1782 in a PG-LQFP-176-6

■ Boundary Condition and Power

- Ambient temperature: TA = 125°C
- Power:
 - 1.52 W (PD A-Step)
1.26 W (PD B-Step)
 - 2.24 W (ED)

■ TC1782 PD

- R_{th}-JC_{top} [K/W] 8.1
- R_{th}-JC_{bot} [K/W] 0.3

■ TC1782 ED

- R_{th}-JC_{top} [K/W] 5.8
- R_{th}-JC_{bot} [K/W] 0.3

LQFP-176

lead pitch: 0.5 mm
package size: 26x26 mm²
body size: 24x24 mm²



Package Outline:



Acrobat Document

(The leadframe number is A6997-C015,
ePad size 7.9 x 7.9)

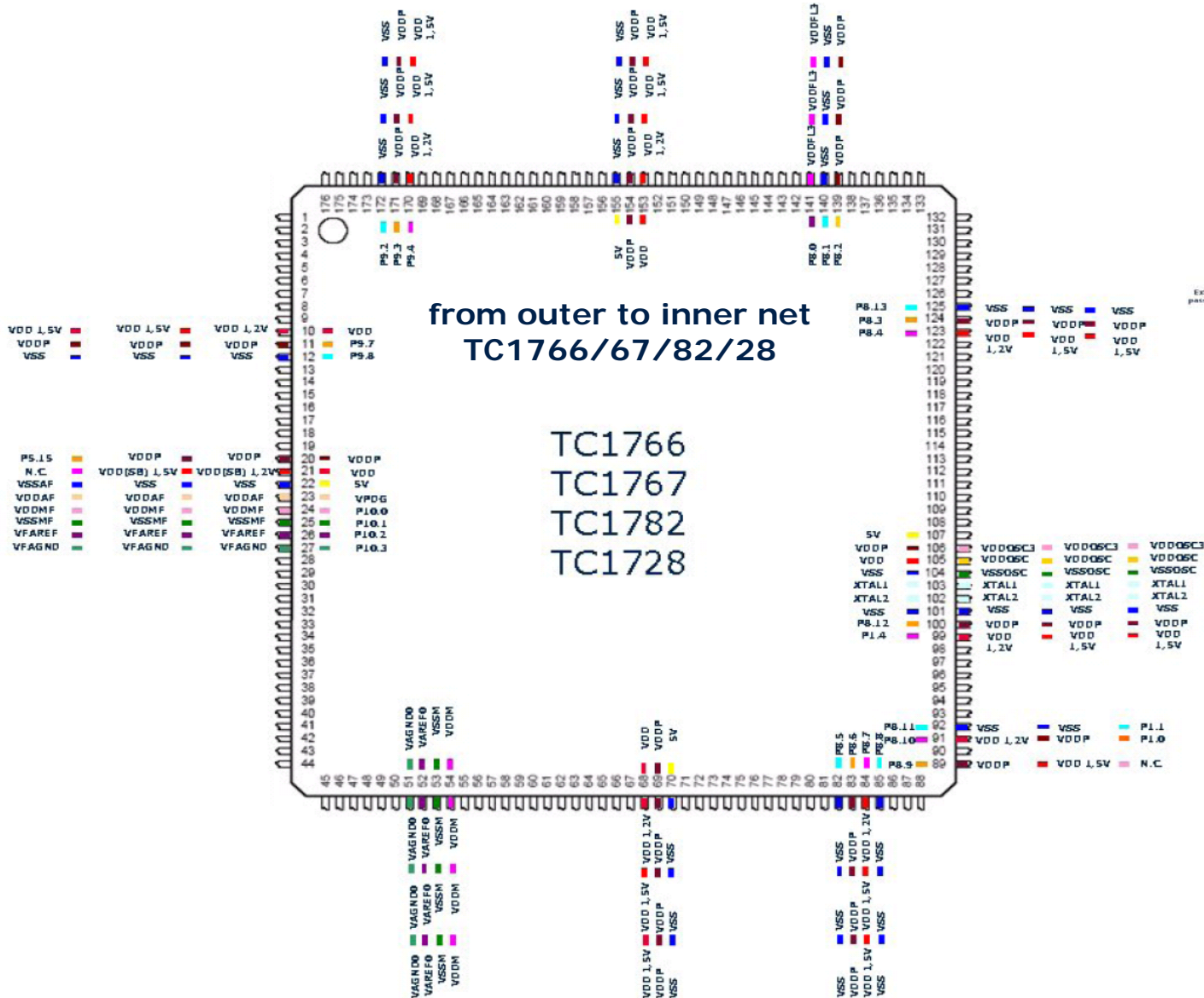
Flowtherm Model:



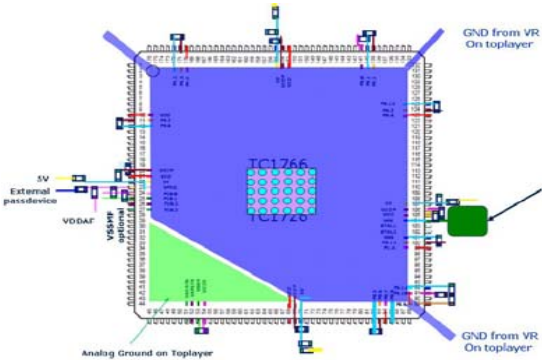
TC1782PD_PG-LQFP-176-6_EP.pdml

TC1766/67/82/28

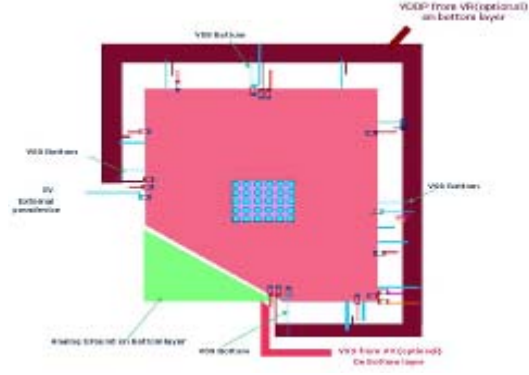
Compatibility Layout options for L-QFP176



PCB Layout Proposal
Top-Layer



PCB Layout Proposal
Bottom-Layer



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