


<b>PCN Number:</b>	20151106000		<b>PCN Date:</b>	11/9/2015
<b>Title:</b>	Qualification of DMOS6 as an additional Fab Site option and FR4xx and FR2xx family Datasheet Updates			
<b>Customer Contact:</b>	<a href="#">PCN Manager</a>		<b>Dept:</b>	Quality Services
<b>Proposed 1<sup>st</sup> Ship Date:</b>	2/9/2016	<b>Estimated Sample Availability:</b>	Date provided at sample request.	
<b>Change Type:</b>				
<input type="checkbox"/> Assembly Site	<input type="checkbox"/> Assembly Process	<input type="checkbox"/> Assembly Materials		
<input type="checkbox"/> Design	<input checked="" type="checkbox"/> Electrical Specification	<input type="checkbox"/> Mechanical Specification		
<input type="checkbox"/> Test Site	<input type="checkbox"/> Packing/Shipping/Labeling	<input type="checkbox"/> Test Process		
<input type="checkbox"/> Wafer Bump Site	<input type="checkbox"/> Wafer Bump Material	<input type="checkbox"/> Wafer Bump Process		
<input checked="" type="checkbox"/> Wafer Fab Site	<input checked="" type="checkbox"/> Wafer Fab Materials	<input type="checkbox"/> Wafer Fab Process		
	<input type="checkbox"/> Part number change			
<b>PCN Details</b>				
<b>Description of Change:</b>				
This change notification is to announce the addition of DMOS6 as an additional Fab site options and datasheet changes as described below:				
<b>Group 1 Devices: Adding DMOS6 Fab Site</b>				
<b>Fab Site:</b>				
Current Site, Process, Wafer Diameter		Additional Site, Process, Wafer Diameter		
DMOS5, HPE035, 200mm		DMOS6, HPE035, 300mm		
<b>Group 2 Devices: MSP430FR4133 adding DMOS6 Fab Site and includes datasheet updates</b>				
<b>Fab Site:</b>				
Current Site, Process, Wafer Diameter		Additional Site, Process, Wafer Diameter		
DMOS5, HPE035, 200mm		DMOS6, HPE035, 300mm		
The datasheet updates are independent of the additional Fab Site qualification.				
The product datasheet(s) is updated as seen in the change revision history below:				
		MSP430FR4133, MSP430FR4132, MSP430FR4131 SLAS865B – OCTOBER 2014 – REVISED AUGUST 2015		
<b>MSP430FR413x Mixed-Signal Microcontrollers</b>				

**Changes from December 20, 2014 to August 14, 2015**

**Page**

- Changed "Standby Mode" current consumption from 770 nA to 1  $\mu$ A ..... [1](#)
- Added [Section 5.2, ESD Ratings](#)..... [14](#)
- Added  $I_{LPM3.5, LCD, CP}$  TYP values at  $-40^{\circ}\text{C}$  (0.90  $\mu$ A) and at  $85^{\circ}\text{C}$  (1.27  $\mu$ A)..... [17](#)
- Added the paragraph that starts "The graphs in this section..."..... [18](#)
- Changed all graphs in [Section 5.9, Typical Characteristics, Low-Power Mode Supply Currents](#), for new measurements ..... [18](#)
- Added  $V_{REF, 1.2V}$  parameter to [Table 5-1, PMM, SVS and BOR](#)..... [20](#)
- Changed  $t_{STE,LEAD}$  MIN value at 2 V from 40 ns to 50 ns ..... [28](#)
- Changed  $t_{STE,LEAD}$  MIN value at 3 V from 24 ns to 45 ns ..... [28](#)
- Changed  $t_{VALID,SO}$  MAX value at 2 V from 55 ns to 65 ns ..... [28](#)
- Changed  $t_{VALID,SO}$  MAX value at 3 V from 30 ns to 40 ns ..... [28](#)
- Changed  $f_{ADCOSEC}$  TYP value from 4.5 MHz to 5.0 MHz ..... [31](#)
- In [Table 6-1, Operating Modes](#), changed the entry for "Power Consumption at  $25^{\circ}\text{C}$ , 3 V" in AM from 100  $\mu$ A/MHz to 126  $\mu$ A/MHz ..... [35](#)
- In [Table 6-1, Operating Modes](#), added "with RTC only" to the entry for "Power Consumption at  $25^{\circ}\text{C}$ , 3 V" in LPM3.5 ..... [35](#)
- In [Table 6-2, Interrupt Sources, Flags, and Vectors](#), removed "FRAM access time error" (ACCTEIFG) from the "System NMI" row ..... [36](#)
- In [Table 6-8, System Module Interrupt Vector Registers](#), changed the interrupt event in the SYSSNIV row with a VALUE of 06h from "ACCTEIFG access time error" to "Reserved" ..... [42](#)
- In [Table 6-27, Device Descriptors](#), added note to "CRC value" ..... [68](#)

The datasheet number will be changing.

Device Family	Change From:	Change To:
MSP430FR413x	SLAS865A	<b>SLAS865B</b>

These changes may be reviewed at the datasheet link provided:

<http://www.ti.com/lit/ds/symlink/msp430fr4133.pdf>



**MSP430FR2033, MSP430FR2032**

SLASE45B –OCTOBER 2014–REVISED AUGUST 2015

**MSP430FR203x Mixed-Signal Microcontrollers**

**Changes from November 1, 2014 to August 14, 2015**

**Page**

- Corrected "10-BIT ADC CHANNELS" column for MSP430FR2032IPM in [Table 3-1, Device Comparison](#) ..... [5](#)
- Added  $T_{stg}$  MIN and MAX values ..... [13](#)
- Added [Section 5.2, ESD Ratings](#)..... [13](#)
- Changed all graphs in [Section 5.9, Typical Characteristics, Low-Power Mode Supply Currents](#), for new measurements ..... [16](#)
- Added  $V_{REF, 1.2V}$  parameter to [Table 5-1, PMM, SVS and BOR](#)..... [18](#)
- Changed  $t_{STE,LEAD}$  MIN value at 2 V from 40 ns to 50 ns ..... [26](#)
- Changed  $t_{STE,LEAD}$  MIN value at 3 V from 24 ns to 45 ns ..... [26](#)
- Changed  $t_{VALID,SO}$  MAX value at 2 V from 55 ns to 65 ns ..... [26](#)
- Changed  $t_{VALID,SO}$  MAX value at 3 V from 30 ns to 40 ns ..... [26](#)
- Changed  $f_{ADCOSEC}$  TYP value from 4.5 MHz to 5.0 MHz ..... [29](#)
- In [Table 6-1, Operating Modes](#), changed the entry for "Power Consumption at  $25^{\circ}\text{C}$ , 3 V" in AM from 100  $\mu$ A/MHz to 126  $\mu$ A/MHz ..... [32](#)
- In [Table 6-1, Operating Modes](#), added "with RTC only" to the entry for "Power Consumption at  $25^{\circ}\text{C}$ , 3 V" in LPM3.5 ..... [32](#)
- In [Table 6-2, Interrupt Sources, Flags, and Vectors](#), removed "FRAM access time error" (ACCTEIFG) from the "System NMI" row ..... [33](#)

The datasheet number will be changing.

Device Family	Change From:	Change To:
MSP430FR203x	SLASE45A	<b>SLASE45B</b>

These changes may be reviewed at the datasheet link provided:

<http://www.ti.com/lit/ds/symlink/msp430fr2032.pdf>

# MSP430FR4xx and MSP430FR2xx Family

## User's Guide

### Revision History

Changes from August 18, 2015 to October 16, 2015	Page
• Added <a href="#">Section 1.9.1.2, FR2433 Memory Map</a> .....	41
• Throughout document, changed "bootstrap loader" to "bootloader" .....	42
• Added <a href="#">Section 1.12.2, FR2433 Configurations</a> .....	47
• Changed reset value of CSCTL6 register in <a href="#">Table 3-2, CS Registers</a> .....	101
• Changed enum options (added "0011b = +64") for DIVA in <a href="#">Table 3-9, CSCTL6 Register Description</a> .....	108
• Added <a href="#">Chapter 13, 32-Bit Hardware Multiplier (MPY32)</a> .....	358
• Added information for 12-bit functionality (in addition to 10-bit functionality) throughout <a href="#">Chapter 15, ADC Module</a> .....	437
• Corrected the formula for $f_{BtClock}$ in <a href="#">Section 17.3.6, Serial Clock Control</a> .....	506
• Corrected the formula for $f_{BtClock}$ in <a href="#">Table 17-4, UCAXBRW Register Description</a> .....	511
• Corrected the formula for $f_{BtClock}$ in <a href="#">Table 17-13, UCXBRW Register Description</a> .....	518
• Corrected software reset (UCSWRST = 1) conditions. ....	526

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

The User's Guide reference number will be changing.

Device Family	Change From:	Change To:
MSP430FR4xx and MSP430FR2xx	SLAU445A	<b>SLAU445B</b>

These changes may be reviewed at the link provided:

<http://www.ti.com/lit/ug/slau445b/slau445b.pdf>

#### Reason for Change:

Additional Fab Site is to ensure continuity of supply. Datasheet updates were made to accurately reflect device characteristics.

#### Anticipated impact on Form, Fit, Function, Quality or Reliability (positive / negative):

None

#### Changes to product identification resulting from this PCN:

Sample product shipping label (not actual product label)

TEXAS INSTRUMENTS  
 MADE IN: Malaysia  
 2DC: 2Q:  
 MSL 2 / 260C / 1 YEAR SEAL DT  
 MSL 1 / 235C / UNLIM 03/29/04  
 OPT:  
 ITEM: 39  
 LBL: 5A (L)T0:1750

(1P) SN74LS07NSR  
 (Q) 2000 (D) 0336  
 (31T) LOT: 3959047MLA  
 (4W) TKY (1T) 7523483S12  
 (P)  
 (2P) REV: (V) 0033517  
 (20L) CS0: SHE (21L) CCO:USA  
 (22L) AS0: MLA (23L) ACC: MYS

#### Group 1 and Group 2 Devices: Fab Site Codes

Chip Site	Chip Site Origin (20L)	Chip Site Country Code (21L)	Chip Site City
DMOS5	DM5	USA	Dallas

#### New Fab Site

Chip Site	Chip Site Origin (20L)	Chip Site Country Code (21L)	Chip Site City
DMOS6	DM6	USA	Dallas

**Product Affected Group 1: (Adding DMOS6 Fab Site)**

MSP430FR2032IG48	MSP430FR59221IPMR	MSP430FR6877IPNR	MSP430FR6928IPM
MSP430FR2032IG48R	MSP430FR59221IRGCR	MSP430FR6877IPZ	MSP430FR6928IPMR
MSP430FR2032IG56	MSP430FR5922IG56R	MSP430FR6877IPZR	MSP430FR6970IPMR
MSP430FR2032IG56R	MSP430FR5922IPM	MSP430FR68791IPN	MSP430FR6970IRGCR
MSP430FR2032IPM	MSP430FR5922IPMR	MSP430FR68791IPNR	MSP430FR69721IPM
MSP430FR2032IPMR	MSP430FR5922IRGCR	MSP430FR68791IPZ	MSP430FR69721IPMR
MSP430FR2033IG48	MSP430FR5970IPMR	MSP430FR68791IPZR	MSP430FR69721IRGCR
MSP430FR2033IG48R	MSP430FR5970IRGCR	MSP430FR6879IPN	MSP430FR69721IRGCT
MSP430FR2033IG56	MSP430FR59721IPM	MSP430FR6879IPNR	MSP430FR6972IPM
MSP430FR2033IG56R	MSP430FR59721IPMR	MSP430FR6879IPZ	MSP430FR6972IPMR
MSP430FR2033IPM	MSP430FR59721IRGCR	MSP430FR6879IPZR	MSP430FR6972IRGCR
MSP430FR2033IPMR	MSP430FR5972IPM	MSP430FR6887IPN	MSP430FR6972IRGCT
MSP430FR4131IG48	MSP430FR5972IPMR	MSP430FR6887IPNR	MSP430FR6977IPN
MSP430FR4131IG48R	MSP430FR5972IRGCR	MSP430FR6887IPZ	MSP430FR6977IPNR
MSP430FR4131IG56	MSP430FR5986IPM	MSP430FR6887IPZR	MSP430FR6977IPZ
MSP430FR4131IG56R	MSP430FR5986IPMR	MSP430FR6888IPN	MSP430FR6977IPZR
MSP430FR4131IPMR	MSP430FR5987IPM	MSP430FR6888IPNR	MSP430FR69791IPN
MSP430FR4132IG48	MSP430FR5987IPMR	MSP430FR6888IPZ	MSP430FR69791IPNR
MSP430FR4132IG48R	MSP430FR5987IRGCR	MSP430FR6888IPZR	MSP430FR69791IPZ
MSP430FR4132IG56	MSP430FR5987IRGCT	MSP430FR68891IPN	MSP430FR69791IPZR
MSP430FR4132IG56R	MSP430FR5988IPM	MSP430FR68891IPNR	MSP430FR6979IPN
MSP430FR4132IPMR	MSP430FR5988IPMR	MSP430FR68891IPZ	MSP430FR6979IPNR
MSP430FR4133IG48	MSP430FR5988IRGCR	MSP430FR68891IPZR	MSP430FR6979IPZ
MSP430FR4133IG48R	MSP430FR5988IRGCT	MSP430FR6889IPN	MSP430FR6979IPZR
MSP430FR4133IG56	MSP430FR59891IPM	MSP430FR6889IPNR	MSP430FR6987IPN
MSP430FR4133IG56R	MSP430FR59891IPMR	MSP430FR6889IPZ	MSP430FR6987IPNR
MSP430FR4133IPM	MSP430FR59891IRGCR	MSP430FR6889IPZR	MSP430FR6987IPZ
MSP430FR4133IPMR	MSP430FR59891IRGCT	MSP430FR6920IG56R	MSP430FR6987IPZR
MSP430FR5870IPMR	MSP430FR5989IPM	MSP430FR6920IPMR	MSP430FR6988IPN
MSP430FR5870IRGCR	MSP430FR5989IPMR	MSP430FR6920IRGCR	MSP430FR6988IPNR
MSP430FR58721IPMR	MSP430FR5989IRGCR	MSP430FR69221IG56	MSP430FR6988IPZ
MSP430FR58721IRGCR	MSP430FR5989IRGCT	MSP430FR69221IG56R	MSP430FR6988IPZR
MSP430FR5872IPMR	MSP430FR6820IG56R	MSP430FR69221IPM	MSP430FR69891IPN
MSP430FR5872IRGCR	MSP430FR6820IPMR	MSP430FR69221IPMR	MSP430FR69891IPNR
MSP430FR5887IPM	MSP430FR6820IRGCR	MSP430FR69221IRGCR	MSP430FR69891IPZ
MSP430FR5887IPMR	MSP430FR68221IG56R	MSP430FR69221IRGCT	MSP430FR69891IPZR
MSP430FR5887IRGCR	MSP430FR68221IPMR	MSP430FR6922IG56	MSP430FR6989IPN
MSP430FR5887IRGCT	MSP430FR68221IRGCR	MSP430FR6922IG56R	MSP430FR6989IPNR
MSP430FR5888IPM	MSP430FR6822IG56R	MSP430FR6922IPM	MSP430FR6989IPZ
MSP430FR5888IPMR	MSP430FR6822IPMR	MSP430FR6922IPMR	MSP430FR6989IPZR
MSP430FR5888IRGCR	MSP430FR6822IRGCR	MSP430FR6922IRGCR	XMS430FR2033IG48
MSP430FR5888IRGCT	MSP430FR6870IPMR	MSP430FR6922IRGCT	XMS430FR2033IG48R
MSP430FR58891IPM	MSP430FR6870IRGCR	MSP430FR69271IPM	XMS430FR4133IG48

MSP430FR58891IPMR	MSP430FR68721IPMR	MSP430FR69271IPMR	XMS430FR4133IG48R
MSP430FR58891IRGCR	MSP430FR68721IRGCR	MSP430FR69271IRGCR	XMS430FR4133IG56
MSP430FR58891IRGCT	MSP430FR6872IPMR	MSP430FR69271IRGCT	XMS430FR4133IG56R
MSP430FR5889IPM	MSP430FR6872IRGCR	MSP430FR6927IPM	XMS430FR4133IPM
MSP430FR5889IPMR	MSP430FR68771IPN	MSP430FR6927IPMR	XMS430FR4133IPMR
MSP430FR5889IRGCR	MSP430FR68771IPNR	MSP430FR6927IRGCR	XMS430FR6972IPM
MSP430FR5889IRGCT	MSP430FR6877IPN	MSP430FR6927IRGCT	XMS430FR6972IPMR
MSP430FR59221IG56R			

**Product Affected Group 2: (Adding DMOS6 Fab Site and Datasheet update)**

MSP430FR2032IG48	MSP430FR2033IG48R	MSP430FR4131IG56	MSP430FR4132IPMR
MSP430FR2032IG48R	MSP430FR2033IG56	MSP430FR4131IG56R	MSP430FR4133IG48
MSP430FR2032IG56	MSP430FR2033IG56R	MSP430FR4131IPMR	MSP430FR4133IG48R
MSP430FR2032IG56R	MSP430FR2033IPM	MSP430FR4132IG48	MSP430FR4133IG56
MSP430FR2032IPM	MSP430FR2033IPMR	MSP430FR4132IG48R	MSP430FR4133IG56R
MSP430FR2032IPMR	MSP430FR4131IG48	MSP430FR4132IG56	MSP430FR4133IPM
MSP430FR2033IG48	MSP430FR4131IG48R	MSP430FR4132IG56R	MSP430FR4133IPMR

**Qualification Report  
Transfer of MSP430FR4133 Device Family to DM6  
Approve Date 17-Jul-2015**

**Product Attributes**

Attributes	MSP430FR4133IG	MSP430FR4133IPM	MSP430FR5969IRGZ	MSP430V541IPZ	MSP430FR5739IDA
Wafer Fab Supplier	DM6	DM6	DM6	DM5	DM6
Wafer Process	HPE035	HPE035	HPE035	HPE035	HPE035
Assembly Site	TI-TAIWAN	TI-TAIWAN	TI-CLARK (Philippines)	TI-TAIWAN	TI-TAIWAN
Package Family	TSSOP	LQFP	VQFN	LQFP	TSSOP
Package Designator	DGG	PM	RGZ	PZ	DA
Green Status	Pb-free and Green	Pb-free and Green	Pb-free and Green	Pb-free and Green	Pb-free and Green

- All devices listed above are qualified at LEVEL3-260C
- All devices listed are qualified Pb-Free (SMT) and Green
- The MSP430FR4133 devices are the qualification devices. MSP430FR5969IRGZ, MSP430V541IPZ, and MSP430FR5739IDA serve as QBS (qualification by similarity) devices.

**Qualification Results**

Data Displayed as: Number of lots / Total sample size / Total failed

Type	Test / Condition	Duration	Device #1: MSP430FR4133IG	Device #2: MSP430FR4133IPM	QBS Device #3: MSP430FR5969IRGZ	QBS Device #4: MSP430V541IPZ	QBS Device #5: MSP430FR5739IDA
CDM	ESD - CDM	250V	1 / 3 / 0	1 / 3 / 0	NA	NA	NA
HBM	ESD - HBM	1000V	QBS Device #2	1 / 3 / 0	NA	NA	NA
LU	Latch-up, 85C	±100mA	QBS Device #2	1 / 3 / 0	NA	NA	NA
LU	Latch-up, 25C	±200mA	QBS Device #2	1 / 3 / 0	NA	NA	NA
EDR**	Endurance, -40C	1e13 Cycles	QBS Device #3	QBS Device #3	3 / 36 / 0	NA	NA
EDR**	Endurance, 25C	1e13 Cycles	QBS Device #3	QBS Device #3	3 / 36 / 0	NA	NA
EDR**	Endurance, 85C	1e13 Cycles	QBS Device #3	QBS Device #3	3 / 36 / 0	NA	NA
EDR**	Endurance, 125C	1e13 Cycles	QBS Device #2/#3	1 / 18 / 0 + QBS Dev #3	3 / 36 / 0	NA	NA
DR	Data Retention/Imprint, 125C/85C	1000 Hours	QBS Device #3	QBS Device #3	3 / 231 / 0	NA	NA
HTOL**	High Temp Operating Life, 125C	1000 Hours	QBS Device #2/#3	1 / 77 / 0	3 / 231 / 0	NA	NA
HTSL**	High Temp Storage Life, 150C	1000 Hours	QBS Device #5	1 / 77 / 0 + QBS Dev #4	NA	3 / 231 / 0	3 / 231 / 0
TC**	Temp Cycle, -65/150C	500 Cycles	QBS Device #5	1 / 77 / 0	NA	NA	3 / 231 / 0
TC**	Temp Cycle, -55C/125C	700 Cycles	NA	QBS Dev #4	NA	3 / 231 / 0	NA
UHAST** or AC**	Unbiased HAST, 130C/85%RH or 121C, 2 ATM	96 Hours	QBS Device #5	1 / 77 / 0 + QBS Dev #4	NA	3 / 231 / 0	3 / 231 / 0
BHAST**	130C, 85% RH	96 Hours	QBS Device #5	NA	NA	NA	3 / 231 / 0
BHAST**	110C, 85% RH	264 Hours	NA	QBS Device #4	NA	3 / 231 / 0	NA

- \*\* Indicates preconditioning to MSL-3 performed prior to these tests.
- NA = Not applicable. This test is not included as it was not required to support the MSP430FR4133 device family qualified in this report.
- Quality and Environmental data is available at TI's external Web site: <http://www.ti.com/>

**Qualification Report**  
**MSP430FR6972 transfer to DM6**  
**LQFP**  
Approved 10/16/2015

**Product Attributes**

Attributes	Qual Device: MSP430FR6972IPM	QBS Device #1: MSP430FR5969IRGZ	QBS Device #2: MSP430V541IPZ
Assembly Site	TI-PHILIPPINES	TI-CLARK	TI-PHILIPPINES
Package Family	LQFP	VQFN	LQFP
Wafer Fab Site	DMOS6	DMOS6	DMOS5
Wafer Fab Process	HPE035	HPE035	HPE035

- QBS: Qual By Similarity
- Qual Device MSP430FR6972IPM DM6 is qualified at LEVEL3-260CG

**Qualification Results**

Data Displayed as: Number of lots / Total sample size / Total failed

Type	Test Name / Condition	Duration	Qual Device: MSP430FR6972IPM	QBS Device #1: MSP430FR5969IRGZ	QBS Device #2: MSP430V541IPZ
HAST**	HAST 130C/85% RH	96 Hours	QBS to #2	NA	3 / 231 / 0
AC**	Autoclave 121C	96 Hours	1 / 77 / 0, QBS to #2	NA	3 / 231 / 0
TC**	Temperature Cycle -55/125C	700 Cycles	QBS to #2	NA	3 / 231 / 0
TC**	Temperature Cycle -65/150C	500 Cycles	1 / 77 / 0	NA	NA
HTSL**	High Temperature Storage Life 150C	1000 Hours	1 / 77 / 0, QBS to #2	NA	3 / 231 / 0
HTOL**	High Operating Life, 125C	1000 Hours	QBS to #1	3 / 231 / 0	NA
DR**	Data retention / imprint 125C/85C	1000 Hours	QBS to #1	3 / 231 / 0	NA
HBM	ESD - HBM	500 V	1 / 3 / 0	NA	NA
CDM	ESD - CDM	250 V	1 / 3 / 0	NA	NA
LU	Latch Up 25C / 1.5 x Vcc	± 200mA	1 / 3 / 0	NA	NA
LU	Latch Up 85C / 1.5 x Vcc	± 100mA	1 / 3 / 0	NA	NA
EDR**	Endurance Test -40C	1E13 Cycles	QBS to #1	3 / 36 / 0	NA
EDR**	Endurance Test 25C	1E13 Cycles	QBS to #1	3 / 36 / 0	NA
EDR**	Endurance Test 85C	1E13 Cycles	QBS to #1	3 / 36 / 0	NA

- \*\* Indicates preconditioning to MSL-3 performed prior to these tests.
- The following are equivalent Temp Cycle options per JEDEC47 : -55C/125C/700 Cycles and -65C/150C/500 Cycles
- Quality and Environmental data is available at TI's external Web site: <http://www.ti.com/>
- **Green/Pb-free Status:** Qualified Pb-Free(SMT) and Green

## Qualification Report

### MSP430FR6972 transfer to DM6 TSSOP Approved 10/16/2015

#### Product Attributes

Attributes	Qual Device: MSP430FR6922IG56	QBS Device #1: MSP430FR6972IPM	QBS Device #2: MSP430FR5969IRGZ	QBS Device #3: MSP430FR5739IDA
Assembly Site	TI-TAIWAN	TI-Philippines	TI-CLARK	TI-TAIWAN
Package Family	TSSOP	LQFP	VQFN	TSSOP
Wafer Fab Site	DM6	DM6	DM6	DM6
Wafer Fab Process	HPE035	HPE035	HPE035	E035.1

- QBS: Qual By Similarity
- Qual Device MSP430FR6922IG56 DM6 is qualified at LEVEL3-260CG

#### Qualification Results

Data Displayed as: Number of lots / Total sample size / Total failed

Type	Test Name / Condition	Duration	Qual Device: MSP430FR6922IG56	QBS Device #1: MSP430FR6972IPM	QBS Device #2: MSP430FR5969IRGZ	QBS Device #3: MSP430FR5739IDA
HAST**	130C/85%RH	96 Hours	QBS to #3	NA	NA	3 / 231 / 0
AC**	Autoclave 121C	96 Hours	QBS to #3	NA	NA	3 / 231 / 0
TC**	Temperature Cycle -65/150C	500 Cycles	1 / 77 / 0, QBS to #3	NA	NA	3 / 231 / 0
DR**	Data retention/imprint 125C/85C	1000 Hours	QBS to #2	NA	3 / 231 / 0	NA
HTSL**	High Temp Storage Life 170C	420 Hours	QBS to #3	NA	NA	3 / 231 / 0
HTOL**	High Temperature Operating Life 125C	1000 Hours	QBS to #2	NA	3 / 252 / 0	NA
HBM	ESD - HBM	500 Volts	QBS to #1	1 / 3 / 0	NA	NA
CDM	ESD - CDM	250 Volts	1 / 3 / 0	NA	NA	NA
LU	Latch Up 25C 1.5 x Vcc	± 200mA	QBS to #1	1 / 3 / 0	NA	NA
LU	Latch Up 85C 1.5 x Vcc	± 100mA	QBS to #1	1 / 3 / 0	NA	NA
EDR**	Endurance Test -40C	1E13 Cycles	QBS to #2	NA	3 / 36 / 0	NA
EDR**	Endurance Test 25C	1E13 Cycles	QBS to #2	NA	3 / 36 / 0	NA
EDR**	Endurance Test 85C	1E13 Cycles	QBS to #2	NA	3 / 36 / 0	NA

- \*\* Indicates preconditioning to MSL-3 performed prior to these tests
- Quality and Environmental data is available at TI's external Web site: <http://www.ti.com/>
- **Green/Pb-free Status:** Qualified Pb-Free(SMT) and Green

**Qualification Report**  
**MSP430FR6972 transfer to DM6 QFN**  
 Approved 10/16/2015

**Product Attributes**

Attributes	Qual Device: MSP430FR6972IRGC	QBS Device #1: FR6972IPM	QBS Device #2: MSP430FR5969IRGZ	QBS Package #3: MSP430FR5969IRGZ
Assembly Site	TI-CLARK	TI-Philippines	TI-CLARK	TI-CLARK
Package Family	VQFN	LQFP	VQFN	VQFN
Wafer Fab Site	DMOS6	DM6	DMOS6	DMOS5
Wafer Fab Process	HPE035	HPE035	HPE035	HPE035

- QBS: Qual By Similarity
- Qual Device MSP430FR6972IRGC DM6 is qualified at LEVEL3-260CG

**Qualification Results**

Data Displayed as: Number of lots / Total sample size / Total failed

Type	Test Name / Condition	Duration	Qual Device: MSP430FR6972IRGC	QBS Device #1: MSP430FR6972IPM	QBS Device #2: MSP430FR5969IRGZ	QBS Device #3: MSP430FR5969IRGZ
AC**	Autoclave 121C	96 Hours	QBS to #3	NA	NA	3 / 231 / 0
TC**	Temperature Cycle -65/150C	500 Cycles	1 / 77 / 0, QBS to #3	NA	NA	3 / 231 / 0
HTSL**	High Temp Storage Life 150C	1000 Hours	QBS to #3	NA	NA	3 / 231 / 0
DR**	Data retention / imprint 125C/85C	1000 Hours	QBS to #2	NA	3 / 231 / 0	NA
HTOL**	High Temperature Operating Life 125C	1000 Hours	QBS to #2	NA	3 / 231 / 0	NA
HBM	ESD - HBM	500 Volts	QBS to #1	1 / 3 / 0	NA	NA
CDM	ESD - CDM	250 Volts	1 / 3 / 0	NA	NA	NA
LU	Latch Up 25C / 1.5 x Vcc	+/- 200mA	QBS to #1	1 / 3 / 0	NA	NA
LU	Latch Up 85C / 1.5 x Vcc	+/- 100mA	QBS to #1	1 / 3 / 0	NA	NA
EDR**	Endurance Test -40C	1E13 Cycles	QBS to #2	NA	3 / 36 / 0	NA
EDR**	Endurance Test 25C	1E13 Cycles	QBS to #2	NA	3 / 36 / 0	NA
EDR**	Endurance Test 85C	1E13 Cycles	QBS to #2	NA	3 / 36 / 0	NA

- \*\* Indicates preconditioning to MSL-3 performed prior to these tests.
- Quality and Environmental data is available at TI's external Web site: <http://www.ti.com/>
- **Green/Pb-free Status:** Qualified Pb-Free(SMT) and Green



**Qualification Report**  
**MSP430FR6989 REV. C transfer to DM6 QFP**  
**Approved 10/30/2015**

**Product Attributes**

Attributes	Qual Device: MSP430FR6989IPZ	QBS Device #1: MSP430FR5969IRGZ	QBS Device #2: MSP430FR4133IPM	QBS Device #3: MSP430FR6989IPZ
<b>Assembly Site</b>	TI-TAIWAN	TI-CLARK	TI-TAIWAN	TI-TAIWAN
<b>Package Family</b>	LQFP	VQFN	LQFP	LQFP
<b>Wafer Fab Site</b>	DMOS6	DMOS6	DMOS6	DMOS5
<b>Wafer Fab Process</b>	HPE035	HPE035	HPE035	HPE035

- QBS: Qual By Similarity
- Qual Device MSP430FR6989IPZ is qualified at LEVEL3-260CG

**Qualification Results**

Data Displayed as: Number of lots / Total sample size / Total failed

Type	Test Name / Condition	Duration	Qual Device: MSP430FR6989IPZ	QBS Device #1: MSP430FR5969IRGZ	QBS Device #2: MSP430FR4133IPM	QBS Device #3: MSP430FR6989IPZ
AC**	Autoclave 121C	96 Hours	QBS to #3	NA	NA	3 / 231 / 0
BHAST**	Biased HAST, 130C, 85% RH	96 Hours	QBS to #3	NA	NA	3 / 231 / 0
TC**	Temperature Cycle -55/150C	700 Cycles	1 / 77 / 0	NA	NA	NA
TC**	Temperature Cycle -65/150C	500 Cycles	QBS to #2	NA	3 / 231 / 0	NA
HTSL**	High Temp Storage Life 150C	1000 Hours	QBS to #2	NA	3 / 231 / 0	3 / 231 / 0
DR**	Data Retention / Imprint, 125C / 85C	1000 Hours	QBS to #1	3 / 231 / 0	NA	NA
HTOL**	High Temperature Operating Life 125C	1000 Hours	QBS to #1	3 / 231 / 0	NA	NA
HBM	ESD - HBM	500, 1000V	1 / 3 / 0	NA	NA	NA
CDM	ESD - CDM	250 V	1 / 3 / 0	NA	NA	NA
LU	Latch Up 25C / 1.5 x Vcc	± 200mA	1 / 3 / 0	NA	NA	NA
LU	Latch Up 85C / 1.5 x Vcc	± 100mA	1 / 3 / 0	NA	NA	NA
EDR**	Endurance Test -40C, 25C, 85C	1E13 Cycles	QBS to #1	3 / 36 / 0 3 / 36 / 0 3 / 36 / 0	NA	NA

- \*\* Indicates preconditioning to MSL-3 performed prior to these tests.
- NA = Not applicable. This test is not included as it was not required to support the MSP430FR6989IPZ device family qualified in this report.

**Qualification Report**  
**MSP430FR5989 Rev. C transfer to DM6 QFN**  
Approved 10/30/2015

**Product Attributes**

Attributes	Qual Device: MSP430FR5989IRGC	QBS Device #1: MSP430FR5969IRGZ	QBS Device #2: MSP430FR6989IPZ	QBS Device #3: MSP430FR5739IRHA
<b>Assembly Site</b>	TI-CLARK	TI-CLARK	TI-TAIWAN	TI-CLARK
<b>Package Family</b>	VQFN	VQFN	LQFP	VQFN
<b>Wafer Fab Site</b>	DMOS6	DMOS6	DMOS6	DMOS6
<b>Wafer Fab Process</b>	HPE035	HPE035	HPE035	E035.1

- QBS: Qual By Similarity
- Qual Device MSP430FR5989IRGC is qualified at LEVEL3-260CG

**Qualification Results**

Data Displayed as: Number of lots / Total sample size / Total failed

Type	Test Name / Condition	Duration	Qual Device: MSP430FR5989IRGC	QBS Device #1: MSP430FR5969IRGZ	QBS Device #2: MSP430FR6989IPZ	QBS Device #3: MSP430FR5739IRHA
AC**	Autoclave 121C	96 Hours	QBS to #3	NA	NA	3 / 231 / 0
BHAST**	Biased HAST, 110C, 85% RH	264 Hours	QBS to #3	NA	NA	3 / 231 / 0
TC**	Temperature Cycle -55/150C	700 Cycles	1 / 77 / 0	NA	NA	NA
TC**	Temperature Cycle -65/150C	500 Cycles	QBS to #3	NA	NA	3 / 231 / 0
HTSL**	High Temp Storage Life 150C	1000 Hours	QBS to #3	NA	NA	3 / 231 / 0
DR	Data Retention / Imprint, 125C / 85C	1000 Hours	QBS to #1	3 / 231 / 0	NA	NA
HTOL**	High Temperature Operating Life 125C	1000 Hours	QBS to #1	3 / 231 / 0	NA	NA
HBM	ESD – HBM	500, 1000V	QBS to #2	NA	1 / 3 / 0	NA
CDM	ESD - CDM	250V	1 / 3 / 0	NA	NA	NA
LU	Latch Up 25C / 1.5 x Vcc	± 200mA	QBS to #2	NA	1 / 3 / 0	NA
LU	Latch Up 85C / 1.5 x Vcc	± 100mA	QBS to #2	NA	1 / 3 / 0	NA
EDR**	Endurance Test -40C, 25C, 85C	1E13 Cycles	QBS to #1	3 / 36 / 0 3 / 36 / 0 3 / 36 / 0	NA	NA

- \*\* Indicates preconditioning to MSL-3 performed prior to these tests.
- NA = Not applicable. This test is not included as it was not required to support the MSP430FR5989 device family qualified in this report.

For questions regarding this notice, e-mails can be sent to the regional contacts shown below, or you can contact your local Field Sales Representative.

<b>Location</b>	<b>E-Mail</b>
USA	<a href="mailto:PCNAmericasContact@list.ti.com">PCNAmericasContact@list.ti.com</a>
Europe	<a href="mailto:PCNEuropeContact@list.ti.com">PCNEuropeContact@list.ti.com</a>
Asia Pacific	<a href="mailto:PCNAsiaContact@list.ti.com">PCNAsiaContact@list.ti.com</a>
Japan	<a href="mailto:PCNJapanContact@list.ti.com">PCNJapanContact@list.ti.com</a>