Cypress Semiconductor
Product Qualification Report

QTP# 154905 VERSION **
April 2017

TR20001C Device Family 130nm Technology, TI 300mm Wafer Fab DMOS 6	
FM25V02A-G	256-Kbit (32K x 8) Serial (SPI) F-RAM
FM25V02A-DG	256-Kbit (32K x 8) Serial (SPI) F-RAM
FM25V02A-DGQ	256-Kbit (32K x 8) Serial (SPI) F-RAM
FM25V01A-G	128-Kbit (16K X 8) SERIAL (SPI) F-RAM
FM24V02A-G	256-Kbit (32K X 8) SERIAL (I2C) F-RAM
FM24V01A-G	128-Kbit (16K X 8) SERIAL (I2C) F-RAM

FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT
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PACKAGE/PRODUCT QUALIFICATION HISTORY

QTP Number	Description of Qualification Purpose	Date
154905	TI FR130 DMOS6 (300mm wafer fab) foundry qualification using TR20001C (128kb & 256kb Industrial 2T2C F-RAM product)	March 2017

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose:	Qualify TI FR130 DMOS6 (300mm wafer fab) foundry using TR20001C (128kb & 256kb Industrial 2T2C F-RAM product)
Marketing Part #:	FM25V02A-G/FM25V02A-DG/FM25V02A-DGQ/FM25V01A-G/FM24V02A-G/FM24V01A-G
Device Description:	128kb & 256kb Industrial and Extended Industrial 2T2C F-RAM product
Cypress Division:	Cypress Semiconductor Corporation – Memory Products Division (MPD)

TECHNOLOGY/FAB PROCESS DESCRIPTION			
Number of Metal Layers:	Proprietary*	Metal Composition:	Proprietary*
Passivation Type and Thickness:			Proprietary*
Generic Process Technology/Design Rule (µ-drawn):			130nm
Gate Oxide Material/Thickness (MOS):			Proprietary*
Name/Location of Die Fab (prime) Facility:			Texas Instruments / Dallas
Die Fab Line ID/Wafer Process ID:			DMOS 6 / E035.1

***Texas Instruments' proprietary information is available with signed NDA.**

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY FACILITY SITE
8L TDFN	UTAC, Thailand (UT)
8L SOIC (150 mils)	UTAC, Thailand (UT)

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	SZ815 / SW815
Package Outline, Type, or Name:	8L SOIC (150mils)
Mold Compound Name/Manufacturer:	G600 / Sumitomo
Mold Compound Flammability Rating:	UL-94 V-0
Mold Compound Alpha Emission Rate:	0.001 count/cm2 h
Oxygen Rating Index: >28%	37%
Lead Frame Designation:	FMP
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	Matte Sn
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	Laser Groove and Wafer Saw
Die Attach Supplier:	Henkel
Die Attach Material:	8600
Bond Diagram Designation	001-92357
Wire Bond Method:	Thermosonic
Wire Material/Size:	CuPd / 0.8 mil
Thermal Resistance Theta JA °C/W:	146 °C/W
Package Cross Section Yes/No:	Yes
Assembly Process Flow:	001-95707
Name/Location of Assembly (prime) facility:	UTAC, Thailand (UT)
MSL Level	MSL3
Reflow Profile	260C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	UTAC, Thailand

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	LH08F
Package Outline, Type, or Name:	8L TDFN
Mold Compound Name/Manufacturer:	G770HCD/Sumitomo
Mold Compound Flammability Rating:	UL-94 V-0
Mold Compound Alpha Emission Rate:	0.001 count/cm2 hr
Oxygen Rating Index: >28%	53%
Lead Frame Designation:	FMP
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	Pure Sn
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	Laser Groove and Wafer Saw
Die Attach Supplier:	Henkel
Die Attach Material:	8200T
Bond Diagram Designation	001-92376
Wire Bond Method:	Thermosonic
Wire Material/Size:	CuPd / 0.8 mil
Thermal Resistance Theta JA °C/W:	31 °C/W
Package Cross Section Yes/No:	Yes
Assembly Process Flow:	001-95577
Name/Location of Assembly (prime) facility:	UTAC, Thailand (UT)
MSL Level	MSL3
Reflow Profile	260C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	UTAC, Thailand

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS

Stress/Test	Test Condition (Temp/Bias)	Result P/F
Acoustic Microscopy	J-STD-020 Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30 °C, 60% RH, 260°C Reflow)	P
Data Retention	150°C, No Bias JESD22-A117 and JESD22-A103	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	500V/750V/1,000V/1,250V/1,500V/1,750V/2,000V JESD22-C101	P
Electrostatic Discharge Human Body Model (ESD-HBM)	1,100V/2,200V /3,300V JESD22, Method A114	P
Endurance Test	MIL-STD-883, Method 883-1033/ JESD22-A117	P
High Accelerated Saturation Test (HAST)	JEDEC STD 22-A110: 130°C, 85% RH, 3.3V Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30 °C, 60% RH, 260°C Reflow)	P
High Temperature Operating Life Early Failure Rate	Dynamic Operating Condition, Vcc Max=3.6V, 125°C JESD22-A-108	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc Max=3.6V, 125°C JESD22-A-108	P
Pressure Cooker	JESD22-A102:121°C /100%RH, 15 PSIG Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30 °C, 60% RH, 260°C Reflow)	P
Static Latch-up	125C, +/-100mA, +/-140mA 85C, +/-140mA, +/- 200mA, +/- 300mA JESD 78	P
Temperature Cycle	MIL-STD-883, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30 °C, 60% RH, 260°C Reflow)	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF[3]	Failure Rate
High Temperature Operating Life Early Failure Rate	3,998 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate	330,000 DHRs	0	0.7	55	** FIT(1)

**Insufficient samples to calculate FIT Rate

[1] Assuming an ambient temperature of 55°C and a junction temperature rise of 15°C.
[2] Chi-squared 60% estimations used to calculate the failure rate.
[3] Thermal Acceleration Factor is calculated from the Arrhenius equation

$$AF = \exp\left[\frac{E_A}{k}\left[\frac{1}{T_2} - \frac{1}{T_1}\right]\right]$$

where:

E_A =The Activation Energy of the defect mechanism.
K = Boltzmann's constant = 8.62×10^{-5} eV/Kelvin.
T_1 is the junction temperature of the device under stress and T_2 is the junction temperature of the device at use conditions.

Reliability Test Data

QTP #: 154905

Device	Package	Fab Lot#	Assy Lot#	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC, MSL3								
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	COMP	25	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	COMP	25	0	
STRESS: DATA RETENTION,150C								
CY15B256Q-SXE	SZ815QSARC	2616000	611632730	UT	500	80	0	
CY15B256Q-SXE	SZ815QSARC	2616000	611632730	UT	1000	80	0	
STRESS: ENDURANCE AND DATA RETENTION								
CY15B256Q-SXE	SZ815QSARC	2616000	611632730	UT	500	79	0	
CY15B256Q-SXE	SZ815QSARC	2616000	611632730	UT	1000	79	0	
STRESS: ESD-CHARGE DEVICE MODEL (500V)								
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	COMP	9	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	COMP	9	0	
FM25V02A7-DG	LH08AFAALC	2645002	611709200	UT	COMP	9	0	
STRESS: ESD-CHARGE DEVICE MODEL (750V)								
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	COMP	3	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	COMP	3	0	
FM25V02A7-DG	LH08AFAALC	2645002	611709200	UT	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL (1000V)								
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	COMP	3	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	COMP	3	0	
FM25V02A7-DG	LH08AFAALC	2645002	611709200	UT	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL (1250V)								
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	COMP	3	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	COMP	3	0	
FM25V02A7-DG	LH08AFAALC	2645002	611709200	UT	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL (1500V)								
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	COMP	3	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	COMP	3	0	
FM25V02A7-DG	LH08AFAALC	2645002	611709200	UT	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL (1750V)								
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	COMP	3	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	COMP	3	0	
FM25V02A7-DG	LH08AFAALC	2645002	611709200	UT	COMP	3	0	

Reliability Test Data

QTP #: 154905

Device	Package	Fab Lot#	Assy Lot#	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-CHARGE DEVICE MODEL (2000V)								
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	2000	3	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	2000	3	0	
FM25V02A7-DG	LH08AFAALC	2645002	611709200	UT	2000	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT (1100V)								
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	1100	3	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	1100	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT (2200V)								
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	2200	8	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	2200	8	0	
STRESS: ESD-HUMAN BODY CIRCUIT (3300V)								
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	3300	3	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	3300	3	0	
STRESS: HIGH ACCELERATED SATURATION TEST (130C, 85%RH, with MSL3 Preconditioning)								
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	96	28	0	
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	192	28	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	96	28	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	192	28	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C								
CY15B256Q-SXE	SZ815QSARC	2616000	611632730	UT	96	1999	0	
CY15B256J-SXE	SZ815QSARC	2616000	611632731	UT	96	1999	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 125C								
CY15B256Q-SXE	SZ815QSARC	2616000	611632730	UT	500	250	0	
CY15B256Q-SXE	SZ815QSARC	2616000	611632730	UT	1000	250	0	
CY15B256J-SXE	SZ815QSARC	2616000	611632731	UT	500	80	0	
CY15B256J-SXE	SZ815QSARC	2616000	611632731	UT	1000	80	0	
STRESS: PRESSURE COOKER TEST (121C,100%RH) , with MSL3 Preconditioning								
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	168	80	0	
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	288	80	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	168	80	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	288	80	0	

Reliability Test Data

QTP #: 154905

Device	Package	Fab Lot#	Assy Lot#	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: STATIC LATCH-UP (+/-100mA 125C)								
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	COMP	3	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	COMP	3	0	
STRESS: STATIC LATCH-UP (+/-140mA 125C)								
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	COMP	3	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	COMP	3	0	
STRESS: STATIC LATCH-UP (+/-140mA 85C)								
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	COMP	3	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	COMP	3	0	
STRESS: STATIC LATCH-UP (+/-200mA 85C)								
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	COMP	3	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	COMP	3	0	
STRESS: STATIC LATCH-UP (+/-300mA 85C)								
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	COMP	3	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	COMP	3	0	
STRESS: TEMPERATURE CYCLE CONDITION C（-65C TO 150C）, with MSL3 Preconditioning								
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	500	80	0	
FM24V02A7-G	SZ815QTALC	2616000	611615110	UT	1000	80	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	500	80	0	
FM24V02A7-G	SZ815QTALC	2616000	611615111	UT	1000	80	0	

Document History Page

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Document Number: 002-19335

Rev.	ECN No.	Orig. of Change	Description of Change
**	5682654	JYF	Initial Release