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# Cypress Semiconductor

## Customer Specific Qualification Report

**QTP# 143801 VERSION\*A**  
**June, 2015**

<b>130nm F-RAM Device Family</b>	
<b>130nm Technology, TI Fab</b>	
<b>FM28V100-TG(TR)</b>	<b>1-Mbit (128 K × 8) Parallel F-RAM Memory</b>
<b>FM25V10-G(TR)</b>	<b>1-Mbit (128 K × 8) Serial (I2C) F-RAM Memory</b>
<b>FM25VN10-G(TR)</b>	<b>1-Mbit (128 K × 8) Serial (I2C) F-RAM Memory</b>
<b>FM25V05-G(TR)</b>	<b>512-Kbit (64 K × 8) Serial (SPI) F-RAM Memory</b>
<b>FM25V05-PGC</b>	<b>512-Kbit (64 K × 8) Serial (SPI) F-RAM Memory</b>
<b>FM24V10-G(TR)</b>	<b>1-Mbit (128 K × 8) Serial (I2C) F-RAM Memory</b>
<b>FM24VN10-G(TR)</b>	<b>1-Mbit (128 K × 8) Serial (I2C) F-RAM Memory</b>
<b>FM24V05-G(TR)</b>	<b>512-Kbit (64 K × 8) Serial (I2C) F-RAM Memory</b>
<b>CG8061AST</b>	<b>1-Mbit (128 K × 8) Parallel F-RAM Memory</b>
<b>CG8061AS</b>	<b>1-Mbit (128 K × 8) Parallel F-RAM Memory</b>
<b>CG8056AS</b>	<b>1-Mbit (128 K × 8) Serial (I2C) F-RAM Memory</b>
<b>CG8055AS</b>	<b>1-Mbit (128 K × 8) Serial (I2C) F-RAM Memory</b>
<b>CG8054AS</b>	<b>512-Kbit (64 K × 8) Serial (SPI) F-RAM Memory</b>
<b>CG8039AS</b>	<b>1-Mbit (128 K × 8) Serial (I2C) F-RAM Memory</b>
<b>CG8038AS</b>	<b>1-Mbit (128 K × 8) Serial (I2C) F-RAM Memory</b>
<b>CG8037AS</b>	<b>512-Kbit (64 K × 8) Serial (I2C) F-RAM Memory</b>
<b>CG8019AAT</b>	<b>1-Mbit (128 K × 8) Parallel F-RAM Memory</b>
<b>CG8019AA</b>	<b>1-Mbit (128 K × 8) Parallel F-RAM Memory</b>

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

QTP Number	Description of Qualification Purpose	Date
143801	Qualification of Additional Passivation Layers on F-RAM Products	Nov 2014

<b>PRODUCT DESCRIPTION (for qualification)</b>	
Qualification Purpose: Qualification of Additional Passivation Layers on F-RAM Products	
Marketing Part #:	FM28V100-TG(TR), FM25V10-G(TR), FM25VN10-G(TR), FM25V05-G(TR), FM25V05-PGC, FM24V10-G(TR), FM24VN10-G(TR), FM24V05-G(TR), CG8061AST, CG8061AS, CG8056AS, CG8055AS, CG8054AS, CG8039AS, CG8038AS, CG8037AS, CG8019AAT, CG8019AA
Device Description:	F-RAM
Cypress Division:	Cypress Semiconductor Corporation – Memory Product Division (MPD)

<b>TECHNOLOGY/FAB PROCESS DESCRIPTION</b>			
Number of Metal Layers:	Proprietary*	Metal Composition:	Proprietary*
Passivation Type and Thickness:	Proprietary*		
Generic Process Technology/Design Rule ( $\mu$ -drawn):	CMOS / 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 5 / E035.1		

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

### ALTERNATIVE PACKAGE AVAILABILITY

<b>PACKAGE</b>	<b>ASSEMBLY FACILITY SITE</b>
8-Pin, 150mil SOIC	UTAC, Thailand
8-Pin, 300mil PDIP	UTAC, Thailand
32-Pin, TSOPI	ASE, Taiwan

Note: **Package Qualification details upon request.**

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	SZ820
Package Outline, Type, or Name:	SOIC 8L (208mils)
Mold Compound Name/Manufacturer:	G600 / Sumitomo
Mold Compound Flammability Rating:	UL 94 V=0 pass
Mold Compound Alpha Emission Rate:	<0.1
Oxygen Rating Index: >28%	53%
Lead Frame Designation:	FMP
Lead Frame Material:	Copper
Substrate Material:	N/A
Lead Finish, Composition / Thickness:	Matte Sn
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	Wafer Saw
Die Attach Supplier:	Henkel
Die Attach Material:	8200T
Bond Diagram Designation	001-86136
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au / 0.8 mil
Thermal Resistance Theta JA °C/W:	118 C/W
Package Cross Section Yes/No:	No
Assembly Process Flow:	001-85398
Name/Location of Assembly (prime) facility:	UTAC, Thailand (UT)
MSL LEVEL	3
REFLOW PROFILE	260C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	UTAC, Thailand / KYEC, Taiwan

**Note:** Please contact a Cypress Representative for other package availability.

## 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 3 192 Hrs, 30C/60%RH+ Reflow, 260°C+0, -5°C	P
Ball Shear	JESD22-B116	P
Bond Pull	MIL-STD-883 – Method 2011, Cpk : 1.33, Ppk : 1.66	P
Aged Bond Strength	200°C, 4HRS MIL-STD-883, Method 883-2011	P
Constructional Analysis	Criteria: Meet external and internal characteristics of Cypress package	P
Data Retention	125°C, 1000 Hours JESD22-A117 and JESD22-A103	P
High Accelerated Saturation Test (HAST)	JEDEC STD 22-A110: 130°C, 85%RH, 3.6V, Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs, 30C/60%RH+ Reflow, 260°C+0, -5°C	P
High Temperature Operating Life Early Failure Rate (EFR)	Dynamic Operating Condition, 125°C, 3.6V, 96 Hours JESD22-A-108	P
High Temperature Operating Life Latent Failure Rate (LFR)	Dynamic Operating Condition, 125°C, 3.6V, 168,1000 Hours JESD22-A-108	P
Pressure Cooker	JESD22-A102:121°C /100%RH, 15 PSIG Precondition: JESD22 Moisture Sensitivity Level 3 96 Hrs, 30C/60%RH+ Reflow, 260°C+0, -5°C	P
Temperature Cycle	MIL-STD-883, Method 1010, Condition C, -65 °C to 150°C, 500 cycles Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs, 30C/60%RH+ Reflow, 260°C+0, -5°C	P

## RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF <sup>3</sup>	Failure Rate
High Temperature Operating Life Early Failure Rate	3600 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life Long Term Failure Rate	1,009,000 DHRs	0	0.7	170	16 FIT *

<sup>1</sup> Assuming an ambient temperature of 55°C and a junction temperature rise of 15°C.

<sup>2</sup> Chi-squared 60% estimations used to calculate the failure rate.

<sup>3</sup> 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<sub>A</sub> = The Activation Energy of the defect mechanism.

K = Boltzmann's constant = 8.62x10<sup>-5</sup> eV/Kelvin.

T<sub>1</sub> is the junction temperature of the device under stress and T<sub>2</sub> is the junction temperature of the device at use conditions.

\*Data leveraged from QTP# 133203: Qualification of Additional Passivation (4000A SiOxNy & 4000A Si3N4) Layers on F-RAM Products

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## Reliability Test Data

**QTP #: 143801**

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej
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**STRESS: ACOUSTIC, MSL3**

CY15B102Q-SXE	4351641	611410018	UTAC	COMP	22	0
FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	COMP	15	0
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	COMP	15	0
FM25V01-G (FM25V01A)	2329041	611340037	LINGSEN	COMP	15	0
FM25V02-G (FM25V02A)	2327007	611339585	UTAC	COMP	15	0
FM25V02-G (FM25V02A)	2329042	611339583	UTAC	COMP	15	0
FM25V02-G (FM25V02A)	2329041	611339581	UTAC	COMP	15	0

**STRESS: BALL SHEAR**

CY15B102Q-SXE	4351641	611410018	UTAC	COMP	30	0
FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	COMP	5	0
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	COMP	5	0
FM25V01-G (FM25V01A)	2329041	611340037	LINGSEN	COMP	5	0
FM25V02-G (FM25V02A)	2327007	611339585	UTAC	COMP	5	0
FM25V02-G (FM25V02A)	2329042	611339583	UTAC	COMP	5	0
FM25V02-G (FM25V02A)	2329041	611339581	UTAC	COMP	5	0

**STRESS: BOND PULL**

CY15B102Q-SXE	4351641	611410018	UTAC	COMP	30	0
FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	COMP	5	0
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	COMP	5	0
FM25V01-G (FM25V01A)	2329041	611340037	LINGSEN	COMP	5	0
FM25V02-G (FM25V02A)	2327007	611339585	UTAC	COMP	5	0
FM25V02-G (FM25V02A)	2329042	611339583	UTAC	COMP	5	0
FM25V02-G (FM25V02A)	2329041	611339581	UTAC	COMP	5	0

**STRESS: AGED BOND PULL (200C, 4 Hours)**

CY15B102Q-SXE	4351641	611410018	UTAC	COMP	5	0
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## Reliability Test Data

**QTP #: 143801**

<b>Device</b>	<b>Fab Lot #</b>	<b>Assy Lot #</b>	<b>Assy Loc</b>	<b>Duration</b>	<b>Samp</b>	<b>Rej</b>
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**STRESS: CLASS YIELD**

CY15B102Q-SXE	4351641	611410018	UTAC	COMP	EQUIVALENT	
FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	COMP	EQUIVALENT	
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	COMP	EQUIVALENT	
FM25V01-G (FM25V01A)	2329041	611340037	LINGSEN	COMP	EQUIVALENT	
FM25V02-G (FM25V02A)	2327007	611339585	UTAC	COMP	EQUIVALENT	
FM25V02-G (FM25V02A)	2329042	611339583	UTAC	COMP	EQUIVALENT	
FM25V02-G (FM25V02A)	2329041	611339581	UTAC	COMP	EQUIVALENT	

**STRESS: CONSTRUCTIONAL ANALYSIS**

FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	COMP	5	0
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	COMP	5	0
FM25V02-G (FM25V02A)	2327007	611339585	UTAC	COMP	5	0
FM25V02-G (FM25V02A)	2329042	611340083	UTAC	COMP	5	0
FM25V02-G (FM25V02A)	2329041	611339581	UTAC	COMP	5	0

**STRESS: DATA RETENTION, 125C**

CY15B102Q-SXE	4351641	611410018	UTAC	500	77	0
CY15B102Q-SXE	4351641	611410018	UTAC	1000	77	0
FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	500	77	0
FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	1000	75	0
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	500	77	0
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	1000	77	0
FM25V02-G (FM25V02A)	2327007	611339585	UTAC	500	77	0
FM25V02-G (FM25V02A)	2327007	611339585	UTAC	1000	77	0
FM25V02-G (FM25V02A)	2329042	611339583	UTAC	500	77	0
FM25V02-G (FM25V02A)	2329042	611339583	UTAC	1000	77	0



## Reliability Test Data

**QTP #: 143801**

**Device**      **Fab Lot #**      **Assy Lot #**      **Assy Loc**      **Duration**      **Samp**      **Rej**

**STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 3.6V), PRE COND 128 HR 30C/60%RH (MSL3)**

CY15B102Q-SXE	4351641	611410018	UTAC	96	77	0
CY15B102Q-SXE	4351641	611410018	UTAC	128	77	0
FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	128	77	0
FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	256	72	0
FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	256	72	0
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	128	77	0
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	256	73	0
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	256	73	0
FM25V01-G (FM25V01A)	2329041	611340037	LINGSEN	128	77	0
FM25V01-G (FM25V01A)	2329041	611340037	LINGSEN	256	72	0
FM25V01-G (FM25V01A)	2329041	611340037	LINGSEN	256	72	0
FM25V02-G (FM25V02A)	2327007	611339585	UTAC	128	63	0
FM25V02-G (FM25V02A)	2327007	611339585	UTAC	128	63	0
FM25V02-G (FM25V02A)	2329042	611339583	UTAC	128	77	0
FM25V02-G (FM25V02A)	2329042	611339583	UTAC	128	77	0
FM25V02-G (FM25V02A)	2329041	611339581	UTAC	128	66	0
FM25V02-G (FM25V02A)	2329041	611339581	UTAC	128	66	0

**STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 3.6V, Vcc Max)**

CY15B102Q-SXE	4351641	611410018	UTAC	96	500	0
CY15B102Q-SXE	4351641	611410018	UTAC	96	1200	0
CY15B102Q-SXE	4351641	611410018	UTAC	96	1800	0
CY15B102Q-SXE	4351641	611410018	UTAC	96	100	0
FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	96	800	0
FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	96	792	0
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	96	799	0
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	96	799	0
FM25V01-G (FM25V01A)	2329041	611340037	LINGSEN	96	800	0
FM25V01-G (FM25V01A)	2329041	611340037	LINGSEN	96	799	0

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## Reliability Test Data

**QTP #: 143801**

<b>Device</b>	<b>Fab Lot #</b>	<b>Assy Lot #</b>	<b>Assy Loc</b>	<b>Duration</b>	<b>Samp</b>	<b>Rej</b>
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 3.6V, Vcc Max)- Continued</b>						
FM25V02-G (FM25V02A)	2327007	611339585	UTAC	96	800	0
FM25V02-G (FM25V02A)	2327007	611339585	UTAC	96	800	0
FM25V02-G (FM25V02A)	2329042	611339583	UTAC	96	800	0
FM25V02-G (FM25V02A)	2329042	611339583	UTAC	96	800	0
FM25V02-G (FM25V02A)	2329041	611339581	UTAC	96	798	0
FM25V02-G (FM25V02A)	2329041	611339581	UTAC	96	798	0

**STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 3.6V, Vcc Max)**

FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	168	77	0
FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	1000	77	0
FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	1000	77	0
FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	1000	77	0
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	168	77	0
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	1000	77	0
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	1000	77	0
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	1000	77	0
FM25V01-G (FM25V01A)	2329041	611340037	LINGSEN	168	77	0
FM25V01-G (FM25V01A)	2329041	611340037	LINGSEN	1000	77	0
FM25V01-G (FM25V01A)	2329041	611340037	LINGSEN	1000	77	0
FM25V01-G (FM25V01A)	2329041	611340037	LINGSEN	1000	77	0
FM25V02-G (FM25V02A)	2327007	611339585	UTAC	168	77	0
FM25V02-G (FM25V02A)	2327007	611339585	UTAC	1000	77	0
FM25V02-G (FM25V02A)	2327007	611339585	UTAC	1000	77	0
FM25V02-G (FM25V02A)	2327007	611339585	UTAC	1000	77	0
FM25V02-G (FM25V02A)	2329042	611339583	UTAC	168	57	0
FM25V02-G (FM25V02A)	2329042	611339583	UTAC	1000	77	0
FM25V02-G (FM25V02A)	2329042	611339583	UTAC	1000	77	0
FM25V02-G (FM25V02A)	2329042	611339583	UTAC	1000	77	0
FM25V02-G (FM25V02A)	2329041	611339581	UTAC	168	77	0

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## Reliability Test Data

**QTP #: 143801**

**Device**                      **Fab Lot #**   **Assy Lot #**   **Assy Loc**      **Duration**   **Samp**   **Rej**

**STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 3.6V, Vcc Max)- Continued**

FM25V02-G (FM25V02A)	2329041	611339581	UTAC	1000	77	0
FM25V02-G (FM25V02A)	2329041	611339581	UTAC	1000	77	0
FM25V02-G (FM25V02A)	2329041	611339581	UTAC	1000	77	0

**STRESS: PRESSURE COOKER TEST (121C, 100%RH, 15 Psig), PRE COND 192 HR 30C/60%RH (MSL3)**

CY15B102Q-SXE	4351641	611410018	UTAC	96	77	0
FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	168	77	0
FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	288	77	0
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	168	77	0
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	288	77	0
FM25V01-G (FM25V01A)	2329041	611340037	LINGSEN	168	77	0
FM25V01-G (FM25V01A)	2329041	611340037	LINGSEN	288	77	0
FM25V02-G (FM25V02A)	2327007	611339585	UTAC	168	77	0
FM25V02-G (FM25V02A)	2327007	611339585	UTAC	288	77	0
FM25V02-G (FM25V02A)	2329042	611339583	UTAC	168	77	0
FM25V02-G (FM25V02A)	2329042	611339583	UTAC	288	77	0
FM25V02-G (FM25V02A)	2329041	611339581	UTAC	168	77	0
FM25V02-G (FM25V02A)	2329041	611339581	UTAC	288	77	0

**STRESS: SORT YIELD**

CY15B102Q-SXE	4351641	611410018	UTAC	COMP	EQUIVALENT
FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	COMP	EQUIVALENT
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	COMP	EQUIVALENT
FM25V02-G (FM25V02A)	2327007	611339585	UTAC	COMP	EQUIVALENT
FM25V02-G (FM25V02A)	2329042	611339583	UTAC	COMP	EQUIVALENT
FM25V02-G (FM25V02A)	2329041	611339581	UTAC	COMP	EQUIVALENT

## Reliability Test Data

**QTP #: 143801**

**Device Fab Lot # Assy Lot # Assy Loc Duration Samp Rej**

**STRESS: TEMPERATURE CYCLE (COND. C, -65C TO 150C), PRE COND 192 HR 30C/60%RH (MSL3)**

CY15B102Q-SXE	4351641	611410018	UTAC	500	77	0
CY15B102Q-SXE	4351641	611410018	UTAC	1,000	77	0
FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	500	77	0
FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	1000	77	0
FM25V01-G (FM25V01A)	2327007	611340032	LINGSEN	1000	77	0
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	500	77	0
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	1000	77	0
FM25V01-G (FM25V01A)	2329042	611340033	LINGSEN	1000	77	0
FM25V01-G (FM25V01A)	2329041	611340037	LINGSEN	500	77	0
FM25V01-G (FM25V01A)	2329041	611340037	LINGSEN	1000	77	0
FM25V01-G (FM25V01A)	2329041	611340037	LINGSEN	1000	77	0
FM25V02-G (FM25V02A)	2327007	611339585	UTAC	500	77	0
FM25V02-G (FM25V02A)	2327007	611339585	UTAC	1000	77	0
FM25V02-G (FM25V02A)	2327007	611339585	UTAC	1000	77	0
FM25V02-G (FM25V02A)	2329042	611339583	UTAC	500	77	0
FM25V02-G (FM25V02A)	2329042	611339583	UTAC	1000	77	0
FM25V02-G (FM25V02A)	2329042	611339583	UTAC	1000	77	0
FM25V02-G (FM25V02A)	2329041	611339581	UTAC	500	77	0
FM25V02-G (FM25V02A)	2329041	611339581	UTAC	1000	77	0
FM25V02-G (FM25V02A)	2329041	611339581	UTAC	1000	77	0



## Document History Page

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Rev.	ECN No.	Orig. of Change	Description of Change
**	4557925	BECK	Initial release
*A	4804542	BECK	Indicated "Proprietary" Items on the "TECHNOLOGY/FAB PROCESS DESCRIPTION" Table, Page 3, and removed proprietary items from Page 2 (Qualification History) and Page 3 (Product Description).

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