

Qualification Report

Approve Date 08-Feb-2019

Qualification Results

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

Type	#	Test Spec	Min Lot Qty	SS/Lot	Test Name / Condition	Duration	Qual Device: <u>TPA2005D1DGNRQ1</u>	Qual Device: <u>TPS79801QDGNRQ1</u>
Test Group A – Accelerated Environment Stress Tests								
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Auto Preconditioning	L2-260C	3/231/0	3/462/0
AC	A3	JEDEC JESD22-A102	3	77	Autoclave, 121C	96 Hours	-	3/231/0
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	500 Cycles	3/231/0	3/231/0
TC-WBP	A4	MIL-STD883 Method 2011	3	30	Auto Post TC Bond Pull	30 ball bonds, min. 5 units	3/90/0	3/90/0
PTC	A5	JEDEC JESD22-A105	1	45	Power Temperature Cycle	1000 Cycles	N/A	N/A
Test Group B – Accelerated Lifetime Simulation Tests								
HTOL	B1	JEDEC JESD22-A108	3	77	Life Test, 125C	1000 Hours	N/A	N/A
ELFR	B2	AEC Q100-008	3	77	Early Failure Rate, 125C	48 Hours	N/A	N/A
EDR	B3	AEC Q100-005	3	77	NVM Endurance, Data Retention, and Operational Life	-	N/A	N/A
Test Group C – Package Assembly Integrity Tests								
WBS	C1	AEC Q100-001	1	30	Wire Bond Shear (Cpk>1.67)	-	-	-
WBP	C2	MIL-STD883 Method 2011	1	30	Bond Pull	76 Wires, 3 units min	3/76/0	3/76/0
WBP	C2	MIL-STD883 Method 2011	1	30	Wire Bond Pull (Cpk>1.67)	-	3/90/0	3/90/0
SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability >95% Lead Coverage (Pb)	>95% Lead Coverage 8 Hours Steam Age	-	3/45/0
SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability >95% Lead Coverage (Pb-Free)	>95% Lead Coverage 8 Hours Steam Age	-	3/45/0
PD	C4	JEDEC JESD22-B100 and B108	3	10	Auto Physical Dimensions	Cpk>1.67	-	3/30/0
LI	C6	JEDEC JESD22-B105	1	50	Lead Pull	# of leads to destruction	-	3/72/0
Test Group D – Die Fabrication Reliability Tests								

Type	#	Test Spec	Min Lot Qty	SS/Lot	Test Name / Condition	Duration	Qual Device: TPA2005D1DGNRQ1	Qual Device: TPS79801QDGNRQ1
EM	D1	JESD61	-	-	Electromigration	-	Completed Per Process Technology Requirements	
TDDDB	D2	JESD35	-	-	Time Dependant Dielectric Breakdown	-	Completed Per Process Technology Requirements	
HCI	D3	JESD60 & 28	-	-	Hot Injection Carrier	-	Completed Per Process Technology Requirements	
NBTI	D4	-	-	-	Negative Bias Temperature Instability	-	Completed Per Process Technology Requirements	
SM	D5	-	-	-	Stress Migration	-	Completed Per Process Technology Requirements	
Miscellaneous Tests								
MQ					Manufacturability (Auto Assembly)	(per automotive requirements)	3/PASS	3/PASS
MSL					Moisture Sensitivity	Level 2 @ 260C	3/36/0	3/36/0
XRAY					X-ray	(top side only)	3/15/0	3/15/0
YLD					FTY and Bin Summary	-	3/PASS	3/PASS

- QBS: Qual By Similarity
- Qual Device TPS79801QDGNRQ1 is qualified at LEVEL2-260C
- Qual Device TPA2005D1DGNRQ1 is qualified at LEVEL2-260C

A1 (PC): Preconditioning:
Performed for THB, Biased HAST, AC, uHAST, TC & PTC samples, as applicable.

Ambient Operating Temperature by Automotive Grade Level:
Grade 0 (or E): -40°C to +150°C
Grade 1 (or Q): -40°C to +125°C
Grade 2 (or T): -40°C to +105°C
Grade 3 (or I) : -40°C to +85°C

E1 (TEST): Electrical test temperatures of Qual samples (High temperature according to Grade level):
Room/Hot/Cold : HTOL, ED
Room/Hot : THB / HAST, TC / PTC, HTSL, ELFR, ESD & LU
Room : AC/uHAST

Green/Pb-free Status:
Qualified Pb-Free(SMT) and Green

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Appendix A

Supply Disruption for Leadframe FM0024

Executive Summary

- Unexpectedly, leadframe (LF) supplier for FM0024 (PEH Hong Kong) is discontinuing operation
- Current LF supply will cover us through March 2019
- Alternate LF with roughened finish is qualified and available for production
- The New rough leadframe has better delamination performance
- New Leadframe supplier for FM0065 and metal finish is already qualified and in high volume production with no known quality events

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Supply Disruption for Leadframe FM0024

Change Description:

Change from PPF FM0024 (PEH) non-roughened to PPF Roughened FM0065 (HDS)

Reason for Change:

Unexpectedly, leadframe (LF) supplier for FM0024 (PEH Hong Kong) is discontinuing operation

PDA (Process Difference Analysis):

Leadframe non-rough PPF to Rough PPF

HDS non-rough PPF leadframe with same finish is already in high volume production and other assembly sites
No history of customer issues with HDS leadframes for any TI Part

Current status:

Qualification completed w/o fails, Observed improved delamination performance with new LF
Current leadframe stock will be exhausted by Mar 31st, 2019

Reason for delay:

Late notification by supplier and sub-supplier

Future Corrective action:

Qualify second assembly and leadframe source for these parts to eliminate future BCP event

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

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