PCN Number:		2	20190211000.2 PC							Feb 18, 2019	
Title: Qualification		of FM0065 Leadframe for Select HVSSOP Package Devices									
Customer Contact:		PC	N Manage	<u>r</u>	Dept:		Quality Servic	es			
Proposed 1 ^s		1 st Ship Dat	e: Aug 15, (See Not					nated Sample lability:		Date Provided at Sample request	
Cha	Change Type:										
	Asser	nbly Site					Design			Wafer	Bump Site
		nbly Process					Data Sheet				Bump Material
		nbly Material				Part number change					Bump Process
		anical Specifi				Test Site		┦┝┙		Fab Site	
	Packi	ng/Shipping/I	_abeling			le	est Process		┦┝┥		Fab Materials
						D		etails		water	Fab Process
Dec	criptio	on of Change	.					etalis			
Description of Change: Texas Instruments Incorporated is announcing the qualification of FM0065 Leadframe for Select HVSSOP package devices listed in the "Product Affected" Section.											
					ren			New			
		,)024	ŀ		FM0065			
		ame p/n		(PEH)				(HDS)			
	Lead	l finish		Non-ro	ughe	ened		Roughened (To	p sid	le)	
Rea	son fo	or Change:									
Not lead disc	Continuity of supply. Note 1: Unexpected discontinuation of operation for PEH Hong Kong leadframe supplier. Current leadframe material inventory is expected to support shipments through March 2019. To avoid discontinuity of supply, we need your approval feedback by March 31 st , 2019 thru your local Field Sales Representative or to the PCN Team (PCN_ww_admin_team@list.ti.com).										
Anticipated impact on Form, Fit, Function, Quality or Reliability (positive / negative):											
None											
Anticipated impact on Material Declaration											
	No Impact to the Material Declaration Material Declaration Material Declaration Material Declaration Material Declaration Material Declaration Material Declaration Material Declaration Production data and will be available following the production release. Upon production release the revised reports can be obtained from the <u>TI Eco-Info website</u> . There is no impact to the material meeting current regulatory compliance requirements with this PCN change.										
Changes to product identification resulting from this PCN:											
None											
Product Affected:											
TPS79801QDGNRQ1				TPS79850QDGNRQ1			RQ1	TPA2005D1TC	GNR	Q1 TF	A2005D1DGNRQ1
								UCC27424QD			····· •····• ••···• ••
		QDGNRDL		UCC273		-		UCC27423QD			

Qualification Report Approve Date 08-Feb-2019

Qualification Results

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

Type # Test Spec Min SS Test Name / Condition Duration Qual Device: TPA2009D1DGNR01 Qual Device: TPA2009D1DGNR01 Test Group - Accelerated Environment Stress Tests Image: Stree Str			Data		ayeu	as: Number of lots	/ Total Sample		
PC A1 JEDEC J- JESD22- A113 3 77 Auto Preconditioning Preconditioning L2-260C 3/231/0 3/462/0 AC A3 JEDEC JESD22- A102 3 77 Autoclave, 121C 96 Hours - 3/231/0 3/462/0 TC A4 JEDEC JESD22- A104 and Appendix 3 3 77 Femperature Cycle, -63/150C 500 Cycles 3/231/0 3/231/0 3/231/0 TC- WBP A4 MIL-STD6803 Method 2011 3 30 Auto Post TC Bond Pull 3/0 ball bonds, min. 5 units 3/90/0 3/90/0 3/90/0 TC- JESD22- A105 JEDEC JESD22- A105 1 45 Power Temperature Cycle 1000 Cycles N/A N/A Test Group B - Accelerated Lettons Simulation Tests JEDEC JESD22- A105 3 77 Early Failure Rate, 12SC 1000 Hours N/A N/A B1 JEDEC JESD22- B100 3 77 Early Failure Rate, 12SC 1000 Hours N/A N/A WB2 C1 AEC Q100- 006 3 77 Early Failure Rate, 12SC -<	Туре	#	Test Spec				Duration		
PC A1 STD-020 JESD22- A103 3 77 Auto Preconditioning L2-260C 3/231/0 3/462/0 AC A3 JESD2- A102 3 77 Autoclave, 121C 96 Hours . 3/231/0 3/231/0 AC A4 JESD2- A102 3 77 Fumperature Cycle, 65/150C 500 Cycles 3/231/0 3/231/0 3/231/0 TC- WBP A4 ML-STD883 Method 2011 3 30 Autoc Post TC Bond Pull 500 Cycles 3/231/0 3/90/0 3/90/0 TC- WBP A4 ML-STD883 Method 2011 3 30 Auto Post TC Bond Pull 1000 Cycles N/A N/A TC- VBP A4 ML-STD883 Method 2011 3 77 Left Est (25C 1000 Hours N/A N/A TC- VBP A4 S2 AEC G100- 3 3 77 Left Pst L25C 1000 Hours N/A N/A TC- VBP C1 AEC G100- 005 3 77 Early Failure Rate, 125C 1000 Hours N/A N/A </td <td colspan="8">Test Group A – Accelerated Environment Stress Tests</td> <td></td>	Test Group A – Accelerated Environment Stress Tests								
AC A3 JEBC2- A102 3 77 Autoclave, 121C 96 Hours - 32231/0 TC A4 JEDEC- JESD2- A104 and Appendix 3 3 77 Temperature Cycle, 65(150C 500 Cycles 3/231/0 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 3/90/0 TC- WBP A4 MIL-STD883 Method 2011 1 45 Power Temperature Cycle 1000 Cycles N/A N/A TOC- MBP JEDEC A105 JEDEC JESD22- 1 45 Power Temperature Cycle 1000 Hours N/A N/A TOC- MED B1 JEDEC JESD22- A105 3 77 Early Failure Rate, 12C 1000 Hours N/A N/A ELFR B2 AEC 0100- 005 3 77 Early Failure Rate, 12C 48 Hours N/A N/A TOS VER C000 3 77 Early Failure Rate, 12C 48 Hours N/A N/A	PC	A1	STD-020 JESD22-	3	77		L2-260C	3/231/0	3/462/0
TC A4 JESD22- A104 and Appendix 3 3 77 Temperature Cycle. -65/10C 500 Cycles $3/231/0$ $3/231/0$ $3/231/0$ TC- WBP A4 MIL-STD883 Method 2011 3 30 Auto Post TC Bond Pull 30 ball bonds, min. 5 units $3'90/0$ $3'90/0$ $3'90/0$ TC A5 JEDEC JESD22- A105 1 45 Power Temperature Cycle 1000 Cycles N/A N/A Test C=VUF Accelerated L/eture SUM TestS V If TestS N/A N/A ELFR B1 JEDEC 006 3 77 Early Failure Rate, 125C 1000 Hours N/A N/A ELFR B2 AEC Q100- 005 3 77 Early Failure Rate, 125C 48 Hours N/A N/A EDR B3 AEC Q100- 005 3 77 Early Failure Rate, 125C 48 Hours N/A N/A WBS C1 AEC Q100- 005 3 77 Vife Bond Pull (Cpk-167) - - - -	AC	A3	JESD22-	3	77	Autoclave, 121C	96 Hours	-	3/231/0
	тс	A4	JESD22- A104 and	3	77		-	3/231/0	3/231/0
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		A4		3	30		bonds, min. 5	3/90/0	3/90/0
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 Data Retention, and Operational Life - N/A N/A WBS C1 AEC Q100- 005 1 30 Bond Pull (Cpk>1.67) - - - WBS C1 AEC Q1010- 001 1 30 Bond Pull (Cpk>1.67) - - - WBP C2 MIL-STD883 Method 2011 1 30 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) Age >95% Lead Coverage 8 Hours Steam Age - 3/45/0 PD C4 JEDEC JESD22- B102 1 15 Surface Mount Solderability >95% Lead Coverage (Pb) Free) >95% Lead Coverage 8 Hours Steam Age - 3/45/0	PTC	A5	JESD22-	1	45		1000 Cycles	N/A	N/A
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Test Gr	roup B	- Accelerated L	ifetime	e Simul	lation Tests			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	HTOL	B1	JESD22-	3	77	Life Test, 125C	1000 Hours	N/A	N/A
EDRB3AEC Q100- 005377Data Retention, and Operational Life-N/AN/ATest C=vvV = Package AssembleIntegrityTestVWBSC1AEC Q100- 001130Wire Bond Shear (Cpk>1.67)WBPC2MIL-STD883 Method 2011130Bond Pull (Cpk>1.67)76 Wires, 3 units min3/76/03/76/0WBPC2MIL-STD883 Method 2011130Surface Mount Solderability >95% Lead Coverage (Pb)>95% Lead Coverage 8 Hours Steam Age3/90/03/90/0SDC3JEDEC JESD22- B102115Surface Mount Solderability >95% Lead Coverage (Pb)>95% Lead Coverage 8 Hours Steam Age.3/45/0PDC4JEDEC JESD22- B100 and B108310Auto Physical DimensionsCpk>1.673/30/0LIC6JEDEC JESD22- B100150Lead Pull# of leads to destruction3/30/0	ELFR	B2		3	77		48 Hours	N/A	N/A
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 Bond Pull (Cpk>1.67) - 3/90/0 3/90/0 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) 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) Head 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 -	EDR	B3		3	77	Data Retention, and	-	N/A	N/A
WBS C1 001 1 30 (Cpk>1.67) -	Test Group C – Package Assembly Integrity Tests								
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	WBS	C1		1	30		-	-	-
WBPC2Method 2011130(Cpk>1.67)- $3/90/0$ $3/90/0$ SDC3JEDEC JESD22- B102115Surface Mount Solderability >95% Lead Coverage (Pb)>95% Lead Coverage 8 Hours Steam Age- $3/45/0$ SDC3JEDEC JESD22- B102115Surface Mount Solderability >95% Lead Coverage (Pb)>95% Lead Coverage 8 Hours Steam Age- $3/45/0$ SDC3JEDEC JESD22- B102115Surface Mount Solderability >95% Lead Coverage (Pb- Free)>95% Lead Coverage 8 Hours Steam Age- $3/45/0$ PDC4JEDEC JESD22- B100 and B108310Auto Physical DimensionsCpk>1.67- $3/30/0$ LIC6JESD22- B105150Lead Pull# of leads to destruction- $3/72/0$	WBP	C2		1	30			3/76/0	3/76/0
SDC3JEDEC JESD22- B102115Surace Mount Solderability >95% Lead Coverage (Pb)Coverage 8 Hours Steam Age-3/45/0SDC3JEDEC JESD22- B102115Surface Mount Solderability >95% Lead Coverage (Pb)>95% Lead Coverage 8 Hours Steam Age-3/45/0SDC3JEDEC JESD22- B102115Surface Mount Solderability >95% Lead Coverage (Pb) Free)>95% Lead Coverage 8 Hours Steam Age-3/45/0PDC4JEDEC JESD22- B100 and B108310Auto Physical Dimensions-Cpk>1.67-3/30/0LIC6JEDEC JESD22- B105150Lead Pull# of leads to destruction-3/72/0	WBP	C2		1	30		-	3/90/0	3/90/0
SDC3JEDEC JESD22- B102115Solderability >95% Lead Coverage (Pb- Free)Coverage 8 Hours Steam Age- $3/45/0$ PDC4JEDEC JESD22- B100 and B1083310Auto Physical DimensionsCpk>1.67- $3/30/0$ LIC6JESD22- B105150Lead Pull# of leads to destruction- $3/72/0$	SD	C3	JESD22-	1	15	Solderability >95%	Coverage 8 Hours Steam	-	3/45/0
PDC4JESD22- B100 and B108310Auto Physical DimensionsCpk>1.67-3/30/0LIC6JESD22- JESD22- B105150Lead Pull# of leads to destruction-3/72/0	SD	C3	JESD22- B102	1	15	Solderability >95% Lead Coverage (Pb-	Coverage 8 Hours Steam	-	3/45/0
LI C6 JESD22- 1 50 Lead Pull # of leads to	PD	C4	JESD22- B100 and B108	3	10		Cpk>1.67	-	3/30/0
Test Group D – Die Fabrication Reliability Tests			JESD22- B105					-	3/72/0
	Test Gr	roup D	0 – Die Fabricatio	on Reli	ability [·]	Tests			

Туре	#	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	
TDDB	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	
Miscella	aneou	s 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

THIS INFORMATION RELATING TO QUALITY AND RELIABILITY IS PROVIDED "AS IS." Product information detailed in this report may not accurately reflect TI's current product materials, processes and testing used in the construction of the TI products. Customers are solely responsible to conduct sufficient engineering and additional qualification testing to determine whether a device is suitable for use in their applications. Using TI products outside limits stated in TI's datasheet may void TI's warranty. See TI's Terms of Sale at <u>http://www.ti.com/lsds/ti/legal/termsofsale.page</u>

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

	🔱 Texas Instrumen
Supply D	isruption for Leadframe FM0024
Change	Description:
	Change from PPF FM0024 (PEH) non-roughened to PPF Roughened FM0065 (HDS)
Reason	or Change:
	Unexpectedly, leadframe (LF) supplier for FM0024 (PEH Hong Kong) is discontinuing operation
PDA (Pri	Incess Difference Analysis): Leadframe non-rough PPF to Rough PPF HDS non-rough PPF leadframe with <u>same finish</u> is already in high volume production and other assembly site 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 31 st , 2019
Reason	or delay: Late notification by supplier and sub-supplier
Future C	orrective action:
	Qualify second assembly and leadframe source for these parts to eliminate future BCP event
TI Confident	II-NDA Restrictions

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

Location	E-Mail
USA	PCNAmericasContact@list.ti.com
Europe	PCNEuropeContact@list.ti.com
Asia Pacific	PCNAsiaContact@list.ti.com
Japan	PCNJapanContact@list.ti.com