PFE0036G

100V N-Channel Fast Switching MOSFET

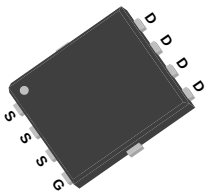
FEATURES

- 100V / 57A
  $R_{DS(ON)}$ = 15.5mR(typ.) @ VGS = 10V
  $R_{DS(ON)}$ = 19.0mR(typ.) @ VGS = 4.5V
- 100% UIS & R_G Tested
- Lead Free and Green Devices Available

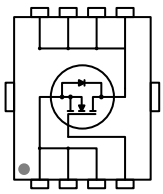
BV_{DSS} = 100 V

$R_{DS(ON)}$ = 15.5 mR

I_D = 57 A



DFN 5x6



APPLICATION

- DC-DC Converter
- Motor Control
- Synchronous buck converter

Absolute Maximum Ratings

T_J=25 °C unless otherwise specified

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-Source Voltage	100	V
I_D	Drain Current – Continuous (T_C = 25 °C)	57	A
	Drain Current – Continuous (T_C = 100 °C)	36	
I_{DM}	Drain Current – Pulsed	228	A
V_{GS}	Gate-Source Voltage	±20	V
P_D	Maximum Power Dissipation (T_C = 25 °C)*	119	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	°C

Thermal Characteristics

Symbol	Parameter	Rating	Unit
R_{THJC}	Thermal Resistance, Junction to Ambient*	1.05	°C/W

Package Marking and Ordering Information

Marking	Device	Package	Remark
PFE0036G	PFE0036G	DFN 5x6	halogen Free

Electrical Characteristics T_C=25 °C unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
On Characteristics						
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 uA	1.2	--	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS} = 10 V, I_D = 7 A	--	15.5	18.5	mR
		V_{GS} = 4.5 V, I_D = 5 A	--	19.0	23.5	
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 uA	100	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 80 V, V_{GS} = 0 V	--	--	10	uA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 20 V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -20 V, V_{DS} = 0 V	--	--	-100	nA
Dynamic Characteristics						
R_G	Gate Resistance	VGS = 0V, VDS = 0V, f = 1MHz	--	1.6	--	R
C_{iss}	Input Capacitance	VDS = 15V, VGS = 0V, f = 1MHz	--	1930	2510	pF
C_{oss}	Output Capacitance		--	245	--	
C_{rss}	Reverse Transfer Capacitance		--	125	--	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 50V, V_{GS} = 10V, R_G = 3.3R, I_D = 7.0A	--	11.5	--	ns
T_r	Turn-On Rise Time		--	29	--	
$t_{d(off)}$	Turn-Off Delay Time		--	42	--	
t_f	Turn-Off Fall Time		--	18	--	
Q_g	Total Gate Charge	V_{DS} = 80V, V_{GS} = 10V, I_D = 7A	--	36	--	nC
Q_{gs}	Gate-Source Charge		--	5	--	
Q_{gd}	Gate-Drain Charge		--	10	--	
Drain-Source Diode Characteristics						
V_{SD}	Diode Forward Voltage	V_{GS} = 0V, Is = 1A	--	--	1.2	V
trr	Reverse Recovery Time	IF = 7A, di/dt = 100A/us	--	48	--	ns
Qrr	Reverse Recovery Charge		--	29	--	nC

Notes ;

1.The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper.

2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

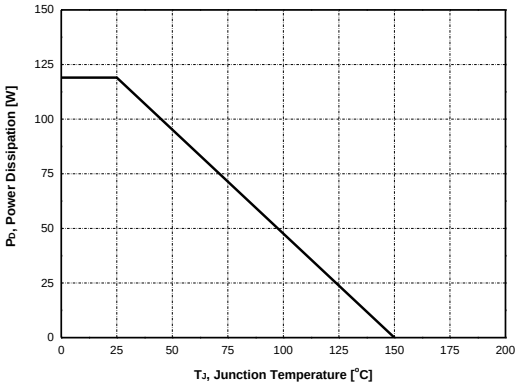
3.The EAS data shows Max. rating . The test condition is VDD=25V,VGS=10V,L=0.1mH

4.The power dissipation is limited by 150℃ junction temperature

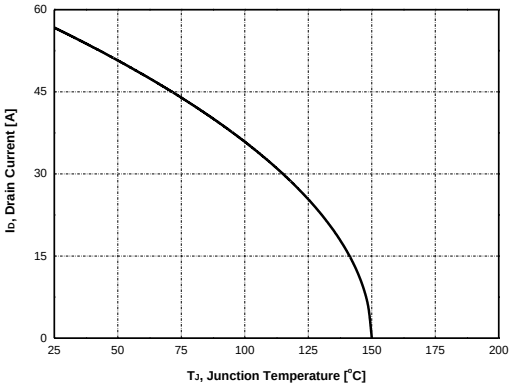
5.The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

Typical Characteristics

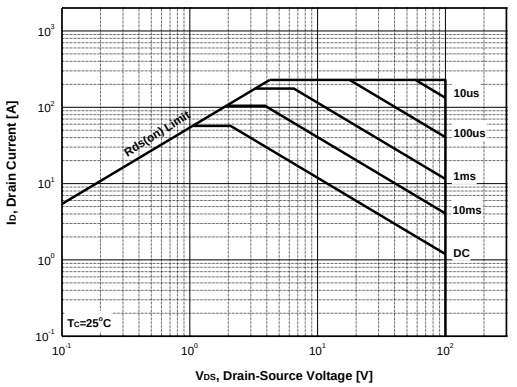
Power Dissipation



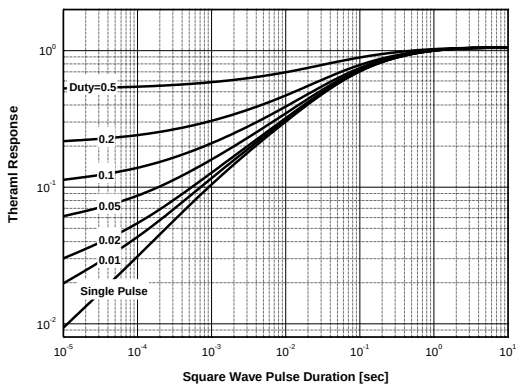
Drain Current



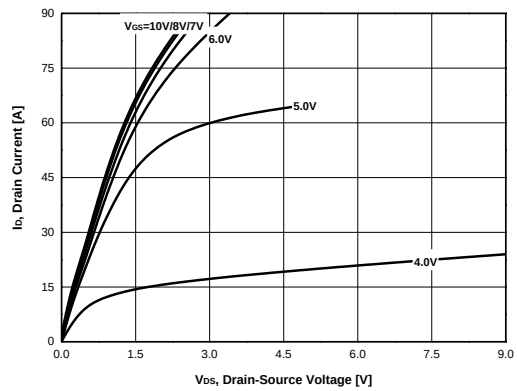
Safe Operation Area



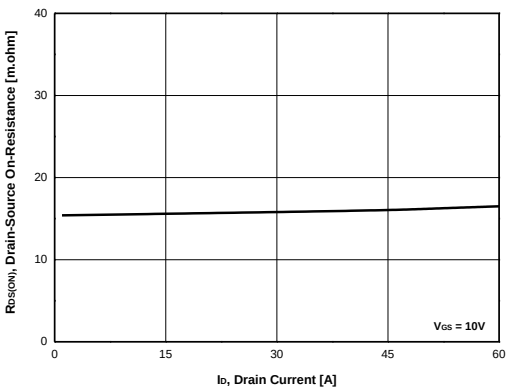
Thermal Transient Impedance



Output Characteristics

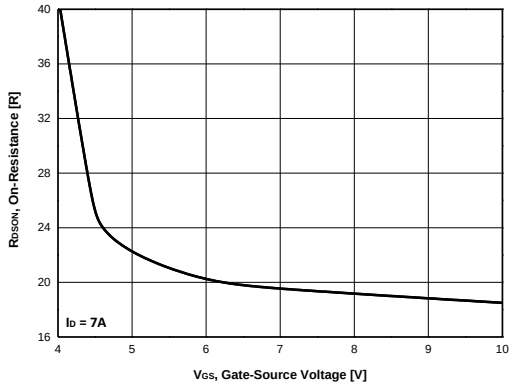


Drain-Source On Resistance

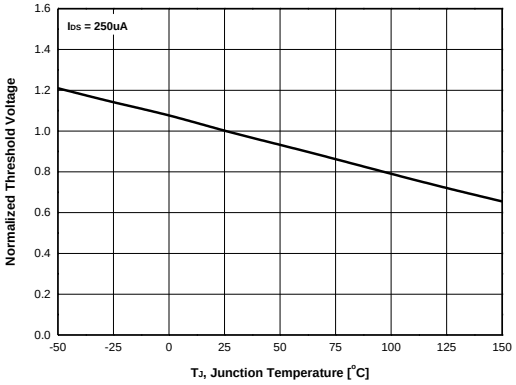


Typical Characteristics (continued)

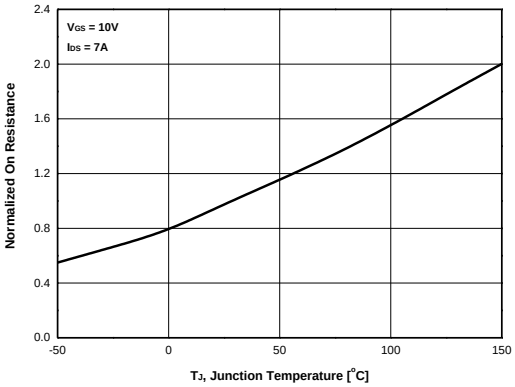
On-Resistance vs. Gate-Source Voltage



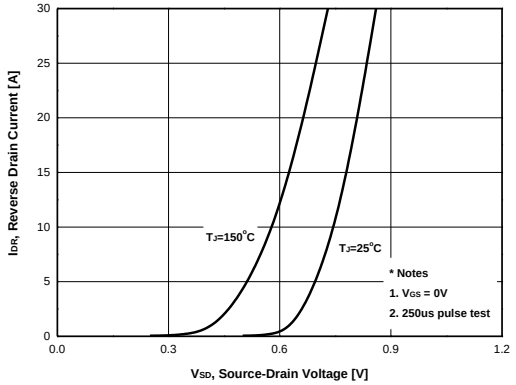
Gate Threshold Voltage



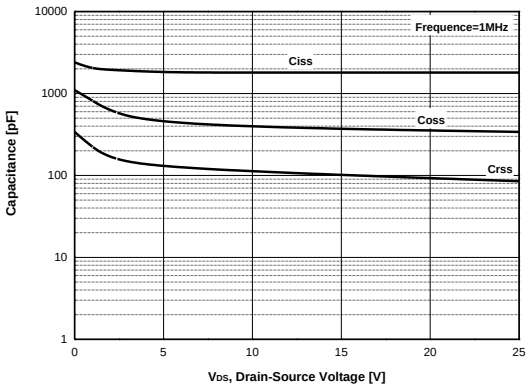
Drain-Source On Resistance



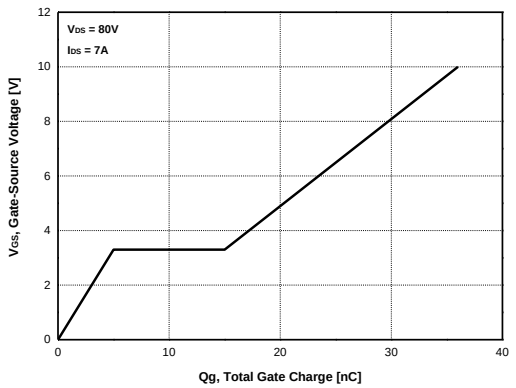
Source-Drain Diode Forward



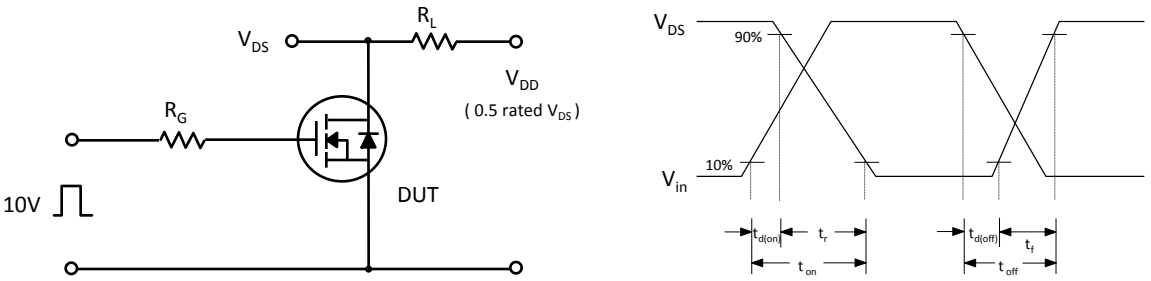
Capacitance



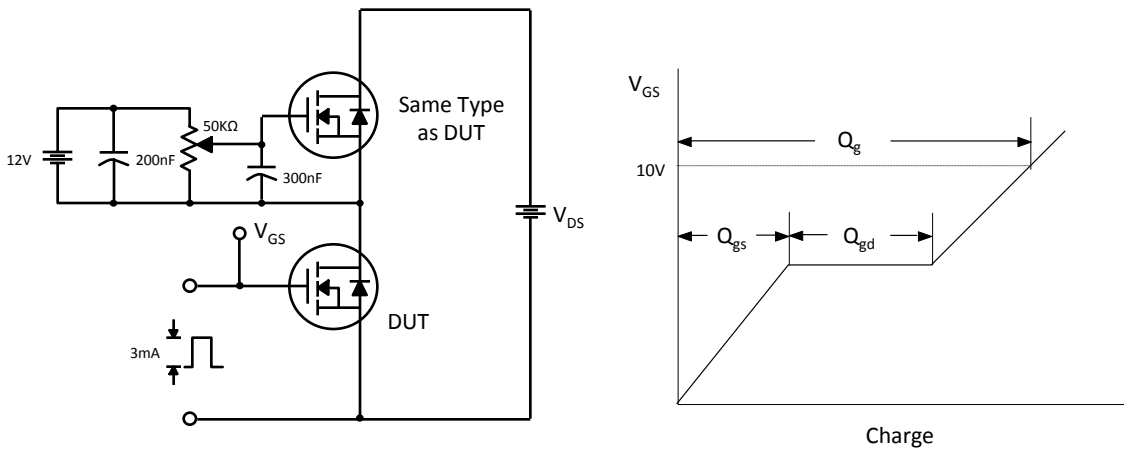
Gate Charge



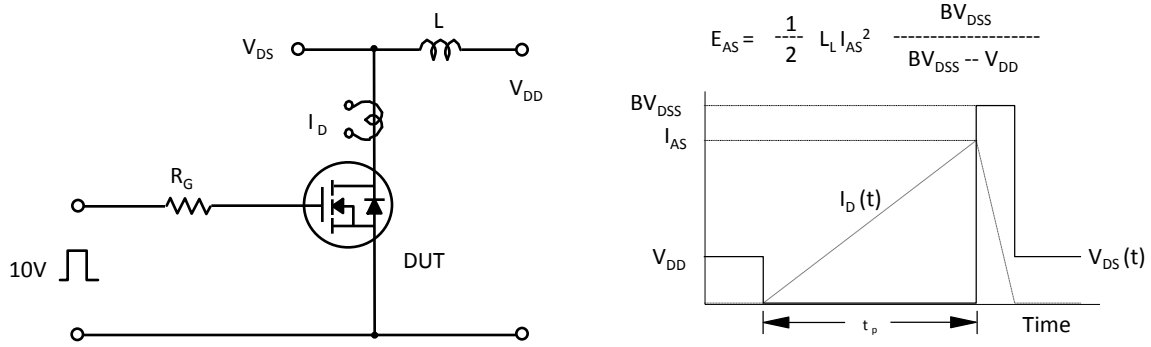
Characteristics Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

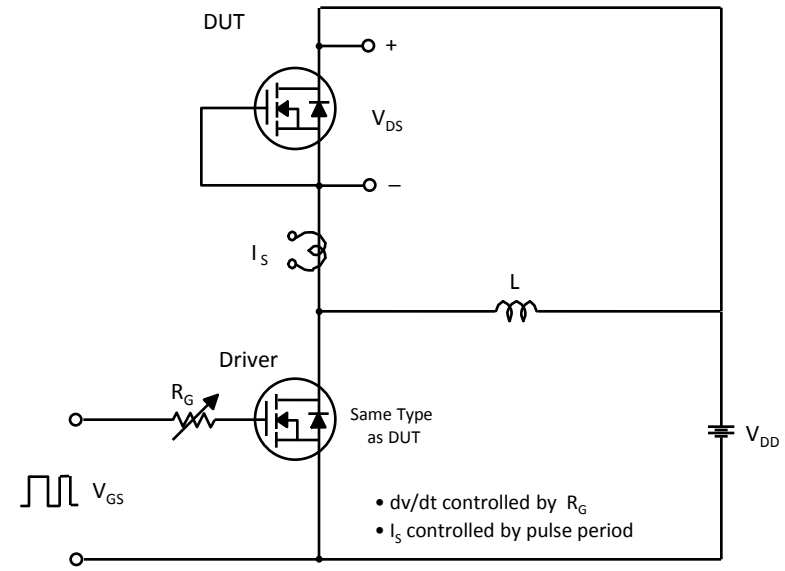


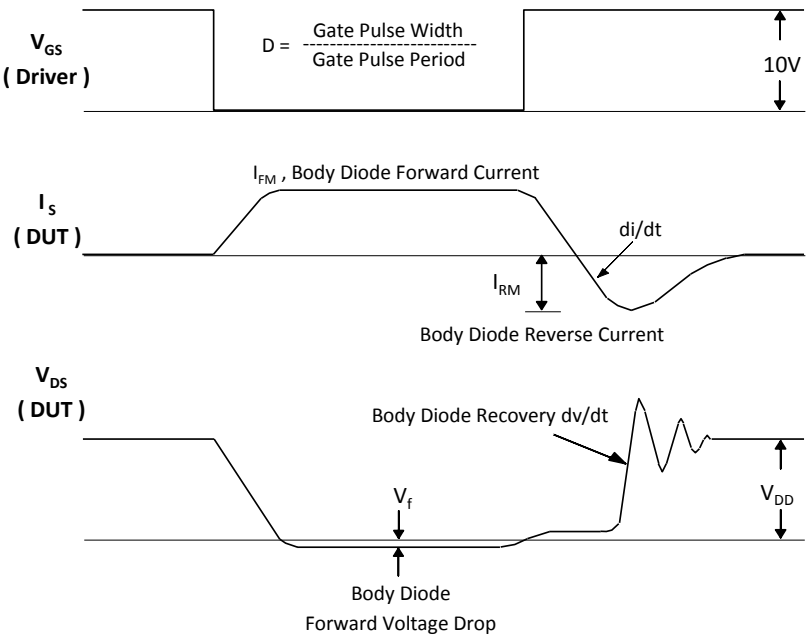
Gate Charge Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveforms

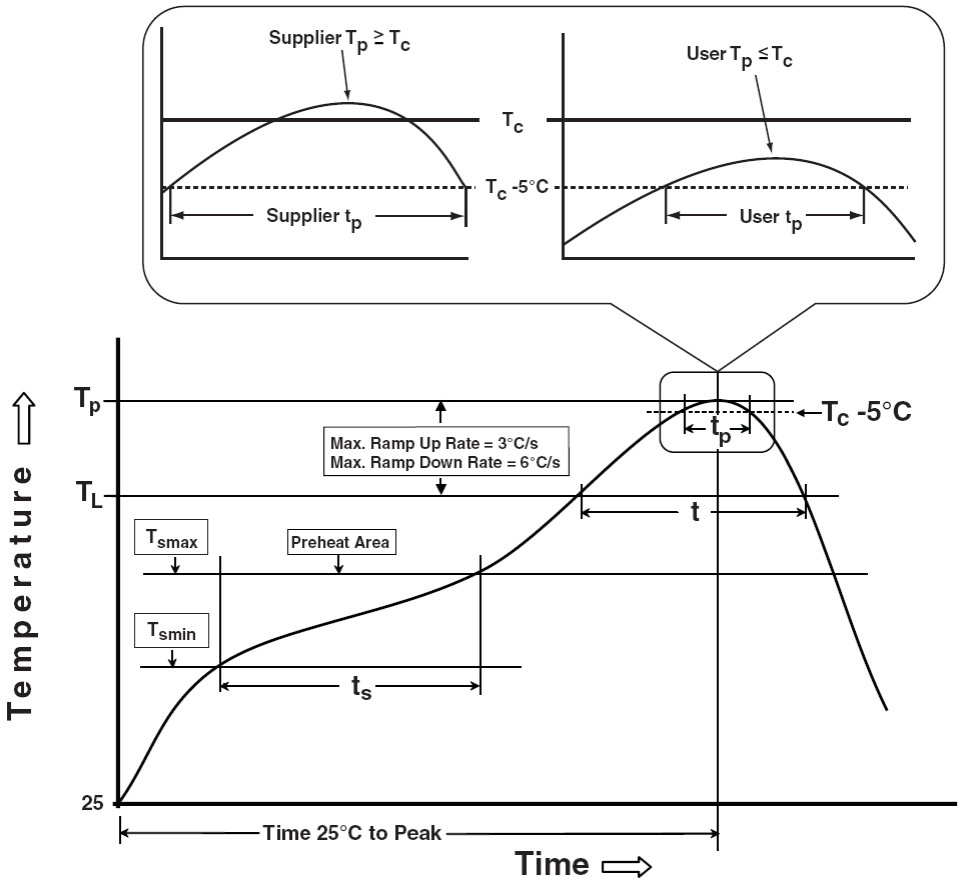
Characteristics Test Circuit & Waveform (continued)





Peak Diode Recovery dv/dt Test Circuit & Waveforms

Classification Profile



Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak Temperature min (T_{smin}) Temperature max (T_{smax}) Time (T_{smin} toT_{smax}) (t_s)	 100 ˚C 150 ˚C 60-120seconds	 150 ˚C 200 ˚C 60-120seconds
Average ramp-up rate (T_{smax} to T_P)	3 ˚C/second max.	3˚C/second max.
Liquidous temperature (T_L) Time at liquidous (t_L)	183 ˚C 60-150seconds	217 ˚C 60-150seconds
Peak package body Temperature (T_P)*	See Classification Temp in table 1	See Classification Temp in table 2
Time (t_P)** within 5˚C of the specified classification temperature (T_c)	20** seconds	30**seconds
Average ramp-down rate (T_P to T_{smax})	6 ˚C/second max.	6 ˚C/second max.
Time 25˚C to peak temperature	6 minutes max.	8 minutes max.
* Tolerance for peak profile Temperature (Tp) is defined as a supplier minimum and a user maximum. ** Tolerance for time at peak profile temperature (tp) is defined as a supplier minimum and a user maximum.		

Table 1. Sn Pb Eutectic Process – Classification Temperatures (Tc)

Package Thickness	Volume mm3 < 350	Volume mm3 ≥ 350
< 2.5 mm	235 ˚C	220 ˚C
≥ 2.5 mm	220 ˚C	220 ˚C

Table 2. Pb-free Process – Classification Temperatures (Tc)

Package Thickness	Volume mm3 < 350	Volume mm3 : 350-2000	Volume mm3 ≥ 2000
< 1.6 mm	260 ˚C	260 ˚C	260 ˚C
1.6 - 2.5 mm	260 ˚C	250 ˚C	245 ˚C
≥ 2.5 mm	250 ˚C	245 ˚C	245 ˚C

Reliability Test Program

Test Item	Method	Description
Solder ability	JESD-22, B102	5 Sec , 245˚C
HTRB	JESD-22, A108	1000 Hrs, 80% of VDS max @ Tjmax
HTGB	JESD-22, A108	1000 Hrs, 100% of VGS max @ Tj max
PCT	JESD-22, A102	168 Hrs, 100%RH, 2atm, 121˚C
TCT	JESD-22, A104	500 Cycl es, -65˚C~150˚ C