

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter		Rating		Unit
			N Channel	P Channel	
V _{DSS}	Drain-Source Voltage		20	-20	V
V _{GSS}	Gate-Source Voltage		±10	±10	
I _D *	Continuous Drain Current	V _{GS} =4.5V (N)	2	-1.4	A
I _{DM} *	300µs Pulsed Drain Current	V _{GS} =-4.5V (P)	8	-5.5	
I _S *	Diode Continuous Forward Current		1	-1	
T _J	Maximum Junction Temperature		150		°C
T _{STG}	Storage Temperature Range		-55 to 150		
P _D *	Power Dissipation	T _A =25°C	0.83		W
		T _A =100°C	0.3		
R _{θJA} *	Thermal Resistance-Junction to Ambient		150		°C/W

Note : *Surface Mounted on 1in² pad area, $t \leq 10\text{sec}$.

Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
Static Characteristics							
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	N-Ch	20	-	-	V
		V _{GS} =0V, I _{DS} =-250μA	P-Ch	-20	-	-	
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =16V, V _{GS} =0V	N-Ch	-	-	1	μA
		T _J =85°C		-	-	30	
		V _{DS} =-16V, V _{GS} =0V	P-Ch	-	-	-1	
		T _J =85°C		-	-	-30	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	N-Ch	0.5	0.7	1	V
		V _{DS} =V _{GS} , I _{DS} =-250μA	P-Ch	-0.5	-0.7	-1	
I _{GSS}	Gate Leakage Current	V _{GS} =±8V, V _{DS} =0V	N-Ch	-	-	±10	μA
		V _{GS} =±8V, V _{DS} =0V	P-Ch	-	-	±10	
V _{SD} ^a	Diode Forward Voltage	I _{SD} =0.5A, V _{GS} =0V	N-Ch	-	0.8	1.3	V
		I _{SD} =-0.5A, V _{GS} =0V	P-Ch	-	-0.8	-1.3	
t _{rr}	Reverse Recovery Time	N-Channel I _{DS} =2A, dI _{SD} /dt=100A/μs	N-Ch	-	12	-	ns
			P-Ch	-	15	-	
Q _{rr}	Reverse Recovery Charge	P-Channel I _{DS} =-1.4, dI _{SD} /dt=100A/μs	N-Ch	-	3	-	nc
			P-Ch	-	4	-	

Electrical Characteristics (Cont.) ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
Static Characteristics (Cont.)							
R _{DS(ON)} ^a	Drain-Source On-State Resistance	V _{GS} =4.5V, I _{DS} =2A	N-Ch	-	125	150	mΩ
		V _{GS} =-4.5V, I _{DS} =-1.4A	P-Ch	-	255	320	
		V _{GS} =2.5V, I _{DS} =1.5A	N-Ch	-	175	230	
		V _{GS} =-2.5V, I _{DS} =-1A	P-Ch	-	400	550	
		V _{GS} =1.8V, I _{DS} =0.5A	N-Ch	-	280	450	
		V _{GS} =-1.8V, I _{DS} =-0.5A	P-Ch	-	600	900	
Dynamic Characteristics ^b							
C _{iss}	Input Capacitance	N-Channel V _{GS} =0V, V _{DS} =10V, Frequency=1.0MHz P-Channel V _{GS} =0V, V _{DS} =-10V, Frequency=1.0MHz	N-Ch	-	115	-	pF
			P-Ch	-	140	-	
C _{oss}	Output Capacitance		N-Ch	-	40	-	
			P-Ch	-	45	-	
C _{rss}	Reverse Transfer Capacitance		N-Ch	-	25	-	
			P-Ch	-	30	-	
t _{d(ON)}	Turn-On Delay Time	N-Channel V _{DD} =10V, R _L =10Ω, I _{DS} =1A, V _{GEN} =4.5V, R _G =6Ω P-Channel V _{DD} =-10V, R _L =10Ω, I _{DS} =-1A, V _{GEN} =-4.5V, R _G =6Ω	N-Ch	-	2	5	ns
			P-Ch	-	3	6	
t _r	Turn-On Rise Time		N-Ch	-	14	26	
			P-Ch	-	12	23	
t _{d(OFF)}	Turn-Off Delay Time		N-Ch	-	12	23	
			P-Ch	-	14	26	
t _f	Turn-Off Fall Time		N-Ch	-	2	5	
			P-Ch	-	3	6	
Gate Charge Characteristics ^b							
Q _g	Total Gate Charge	N-Channel V _{DS} =10V, V _{GS} =4.5V, I _{DS} =2A P-Channel V _{DS} =-10V, V _{GS} =-4.5V, I _{DS} =-1.4A	N-Ch	-	1.8	2.5	nC
			P-Ch	-	2.2	3.1	
Q _{gs}	Gate-Source Charge		N-Ch	-	0.3	-	
			P-Ch	-	0.3	-	
Q _{gd}	Gate-Drain Charge		N-Ch	-	0.7	-	
			P-Ch	-	0.7	-	

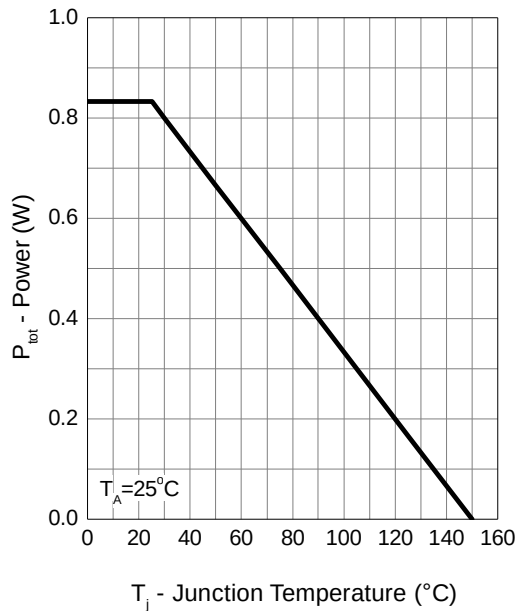
Note a : Pulse test ; pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

Note b : Guaranteed by design, not subject to production testing.

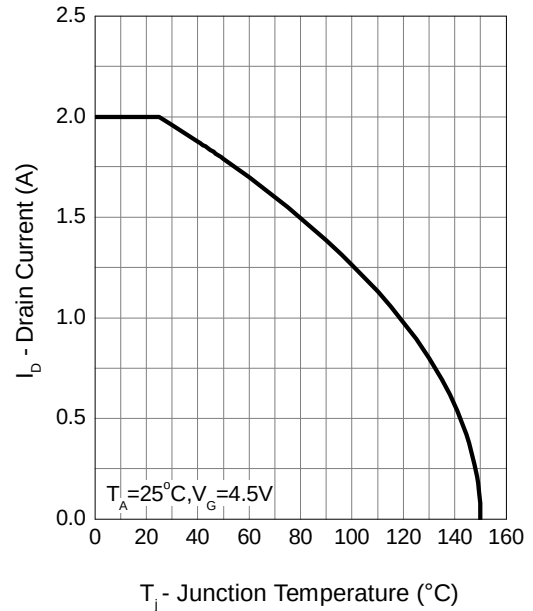
Typical Operating Characteristics

N-Channel

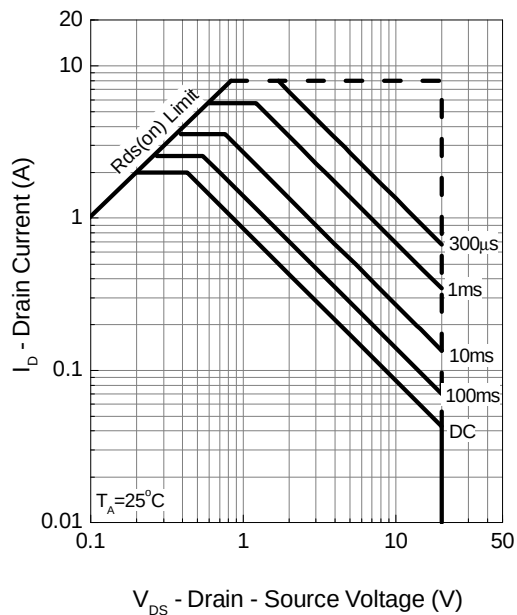
Power Dissipation



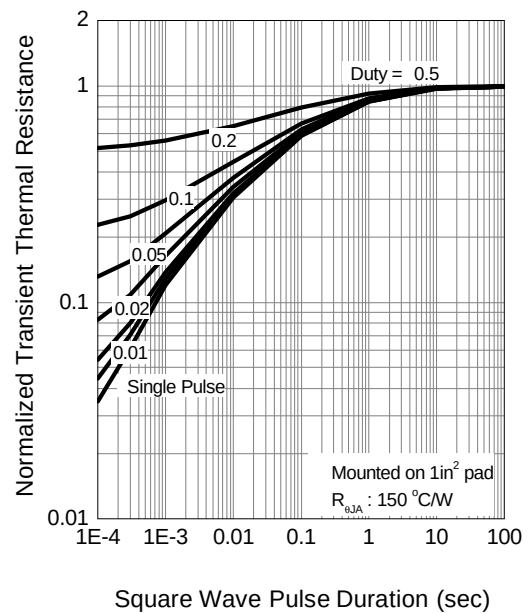
Drain Current



Safe Operation Area



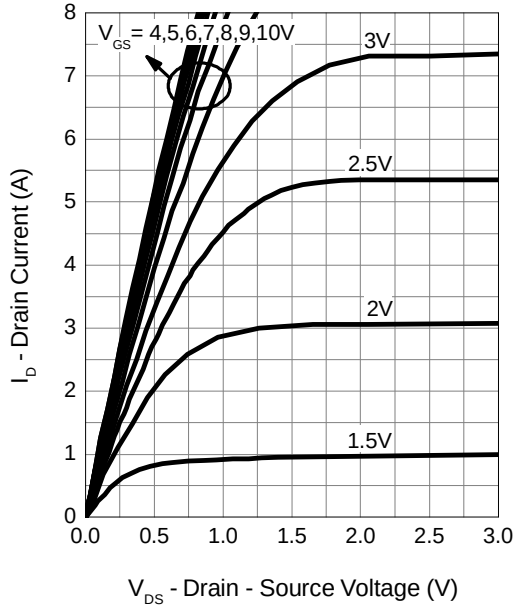
Thermal Transient Impedance



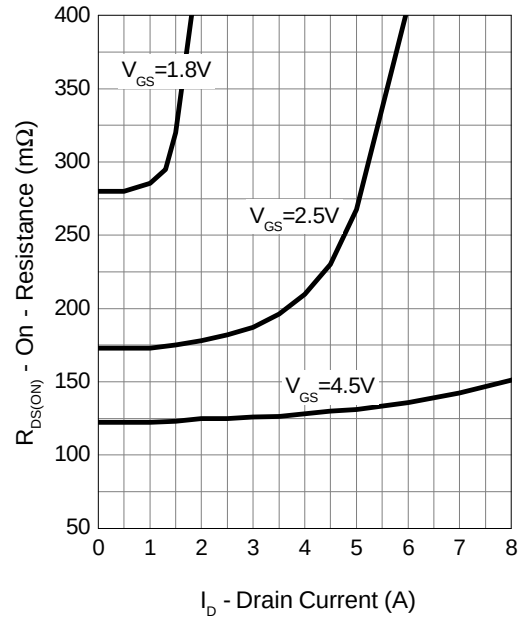
Typical Operating Characteristics (Cont.)

N-Channel

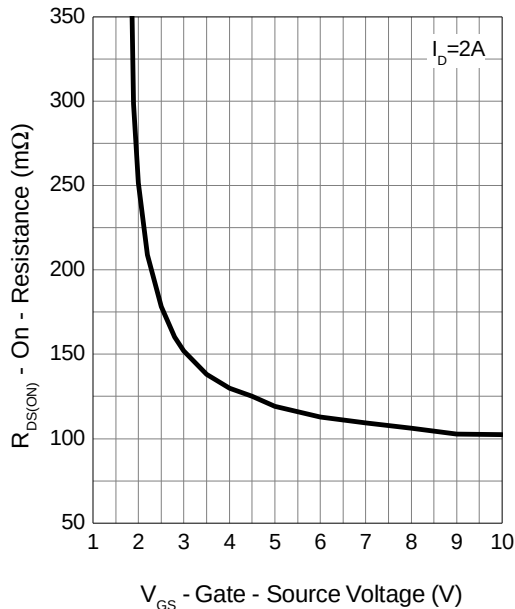
Output Characteristics



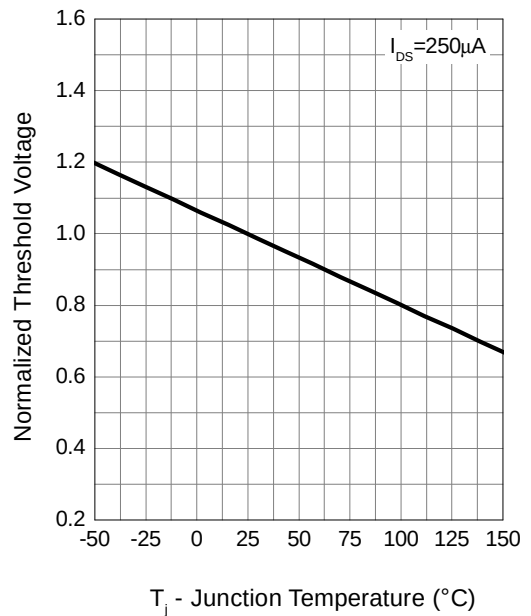
Drain-Source On Resistance



Drain-Source On Resistance



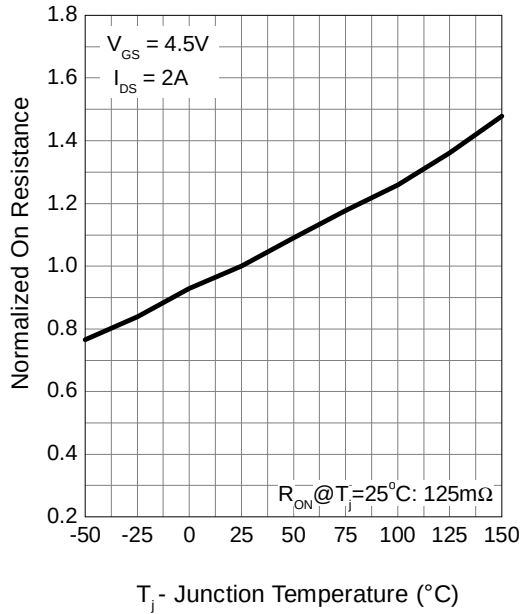
Gate Threshold Voltage



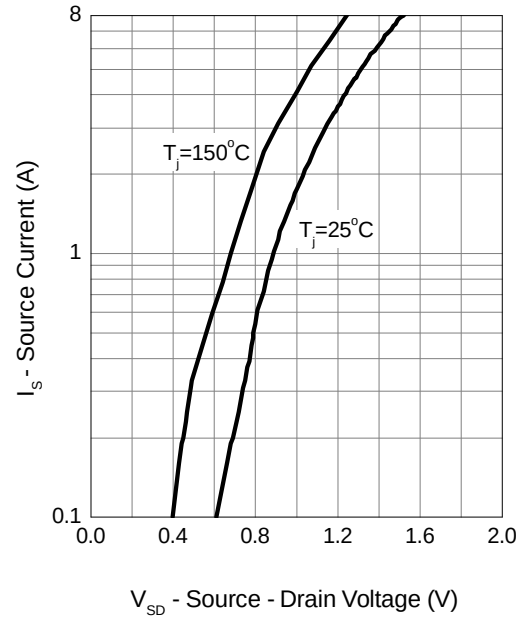
Typical Operating Characteristics (Cont.)

N-Channel

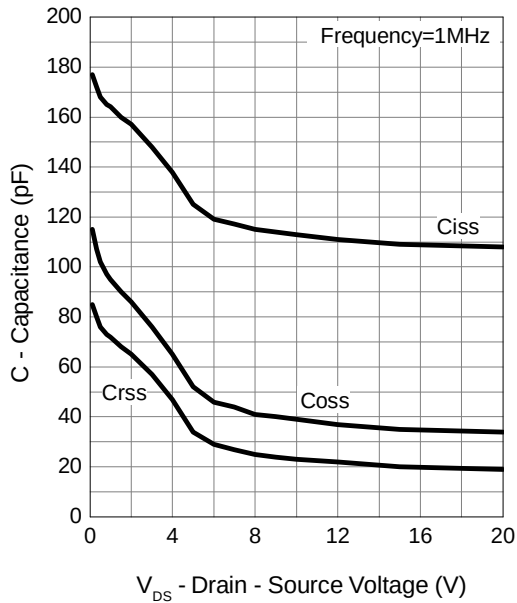
Drain-Source On Resistance



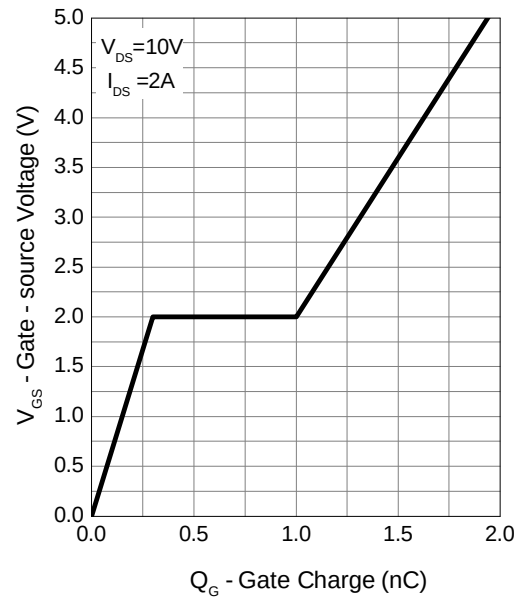
Source-Drain Diode Forward



Capacitance



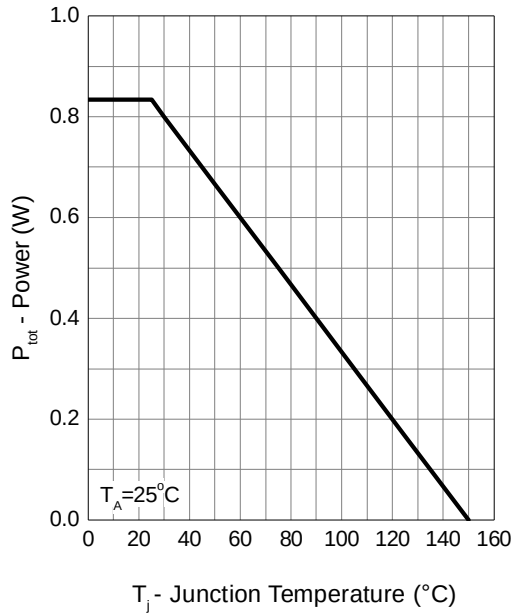
Gate Charge



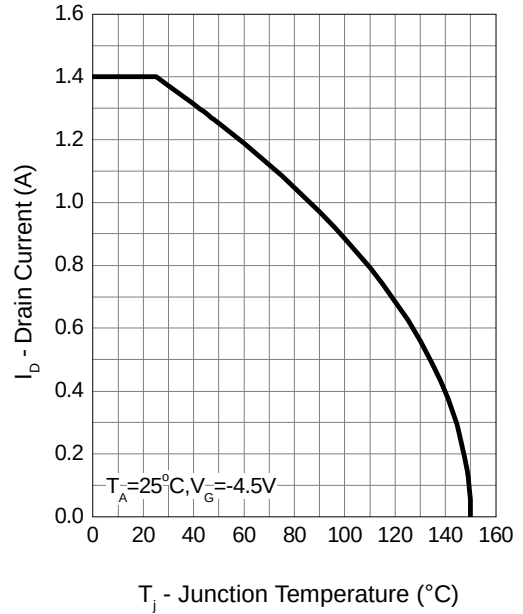
Typical Operating Characteristics (Cont.)

P-Channel

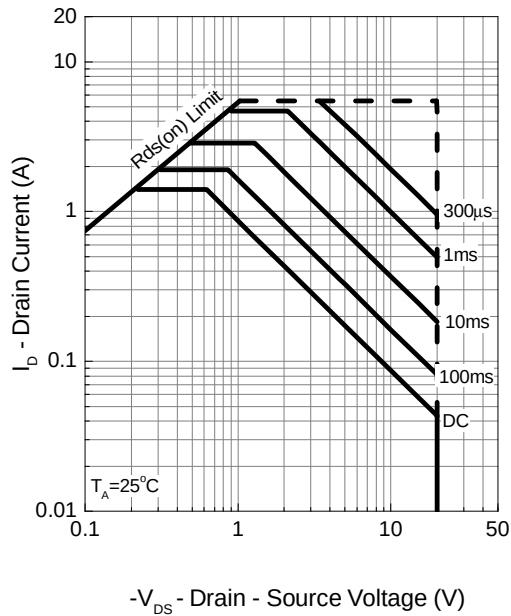
Power Dissipation



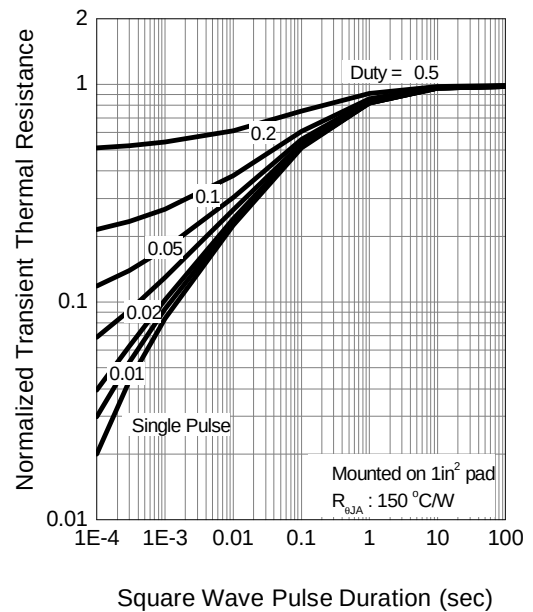
Drain Current



Safe Operation Area



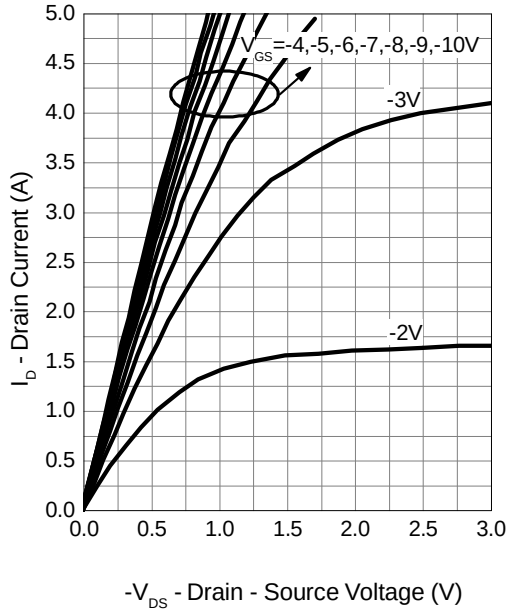
Thermal Transient Impedance



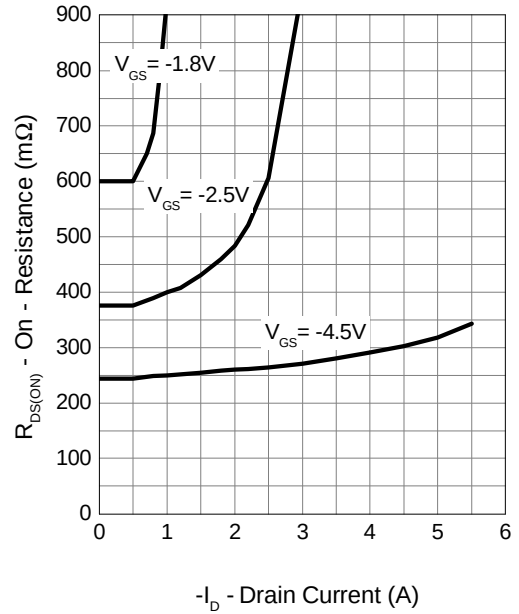
Typical Operating Characteristics (Cont.)

P-Channel

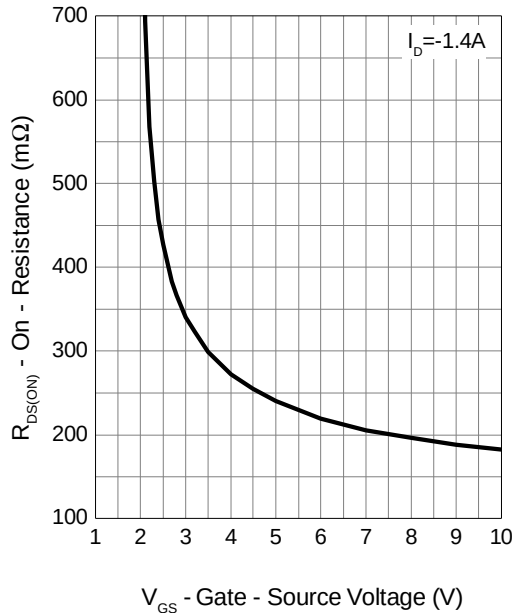
Output Characteristics



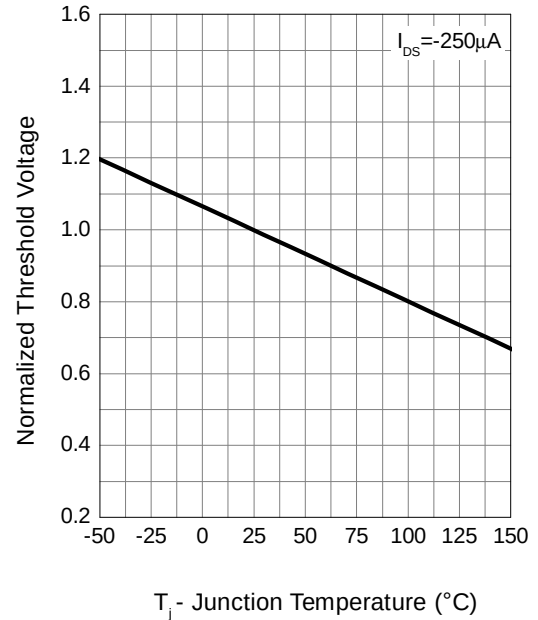
Drain-Source On Resistance



Drain-Source On Resistance



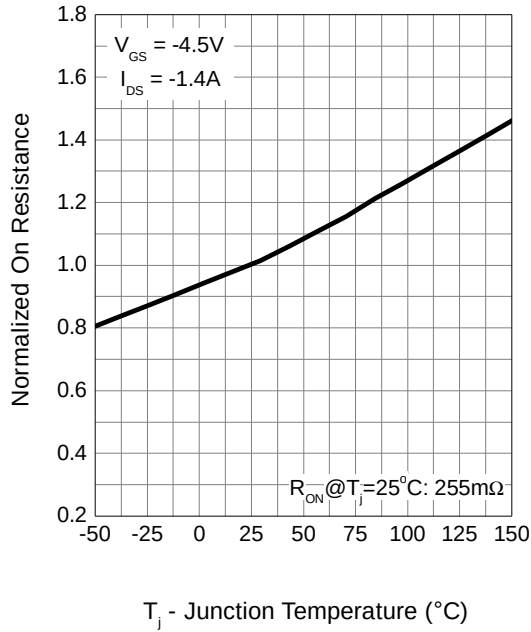
Gate Threshold Voltage



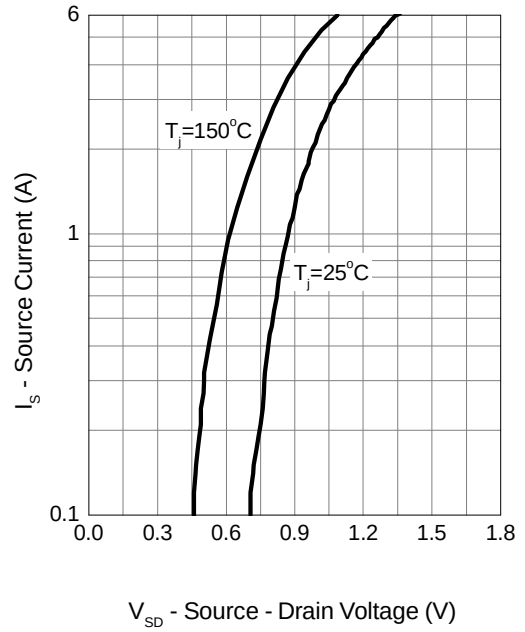
Typical Operating Characteristics (Cont.)

P-Channel

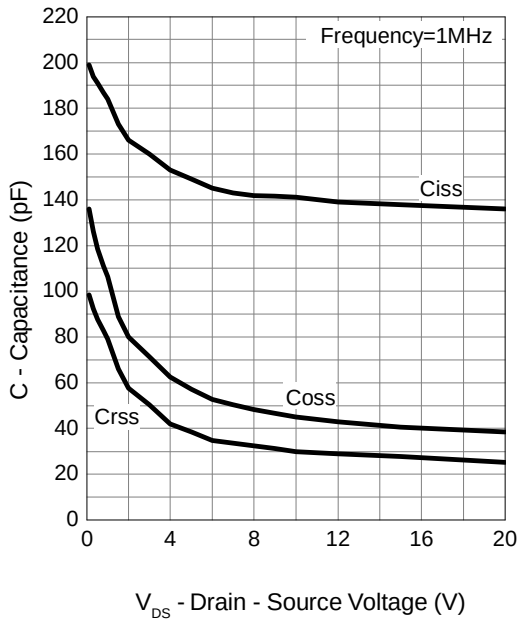
Drain-Source On Resistance



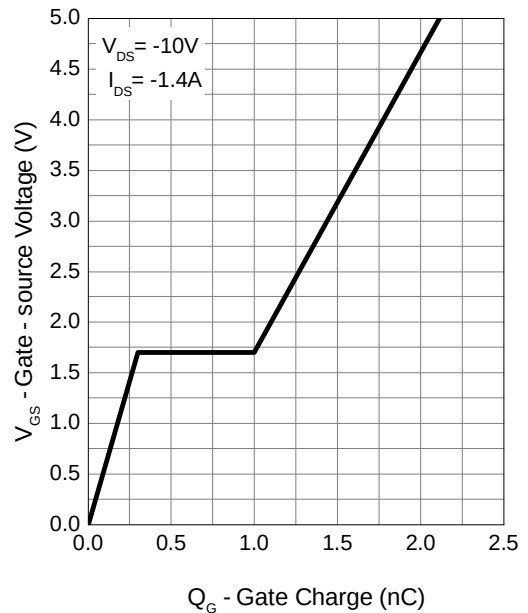
Source-Drain Diode Forward



Capacitance

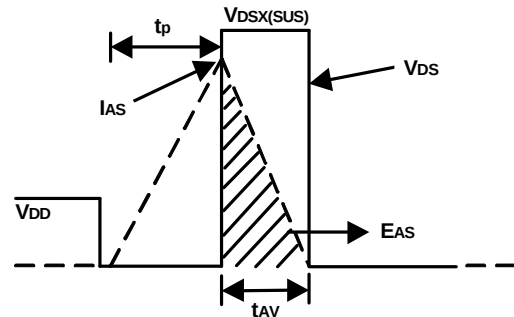
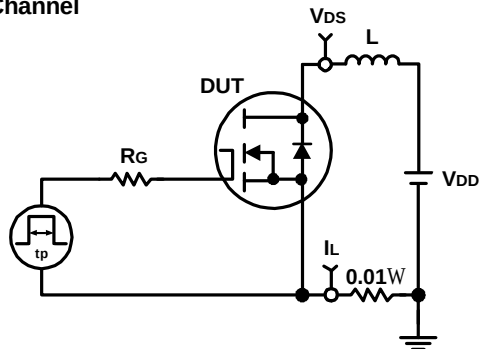


Gate Charge

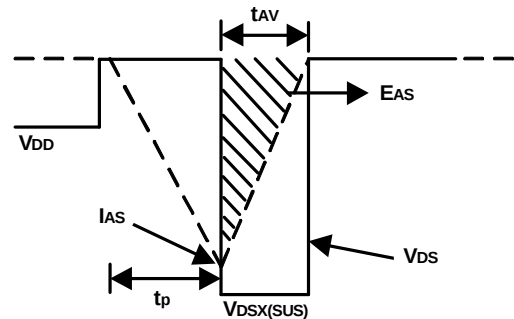
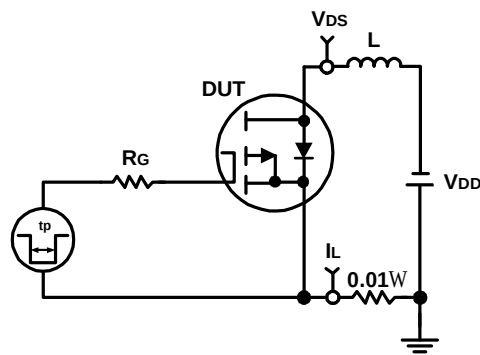


Avalanche Test Circuit and Waveforms

N Channel

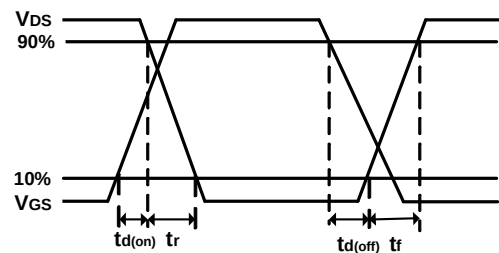
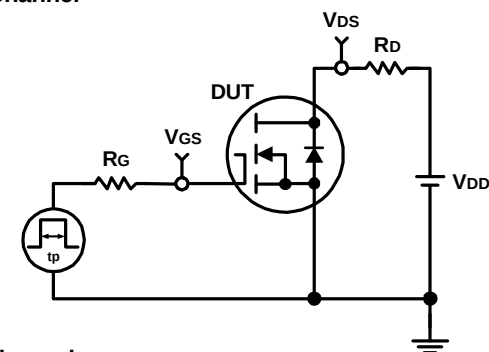


P Channel

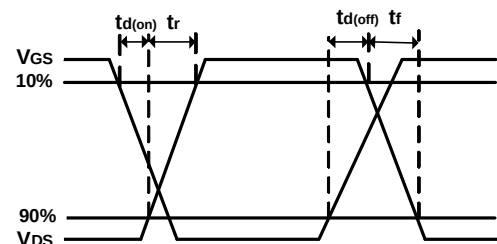
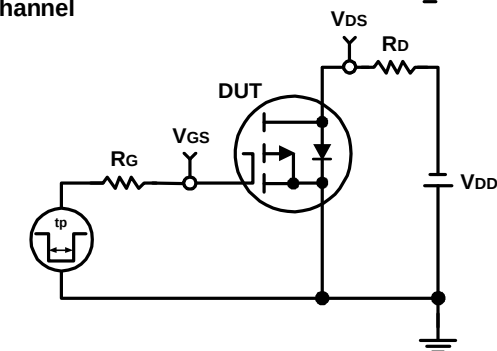


Switching Time Test Circuit and Waveforms

N Channel

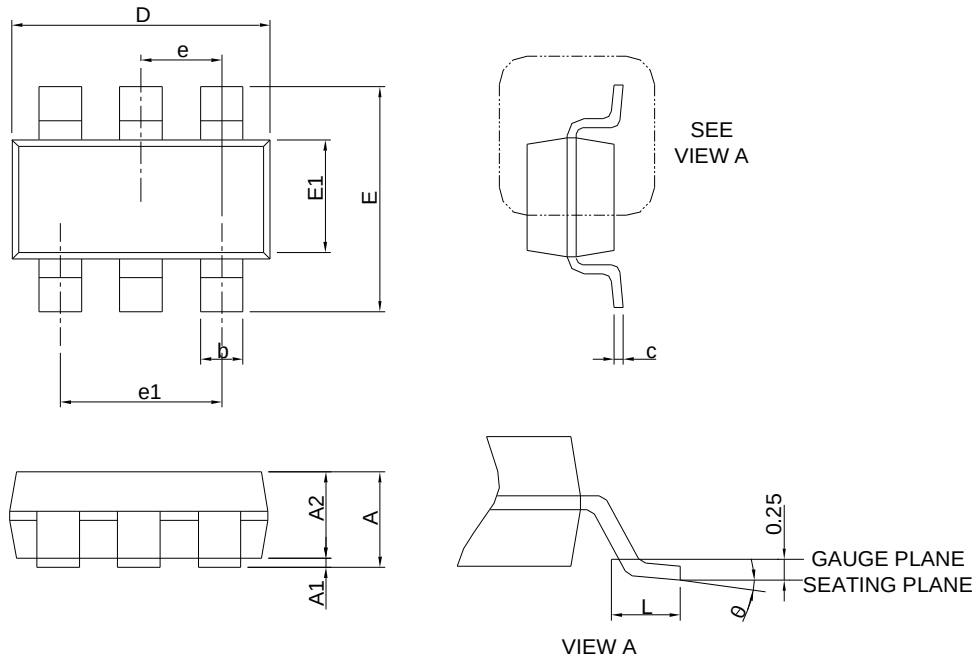


P Channel



Package Information

SOT-23-6

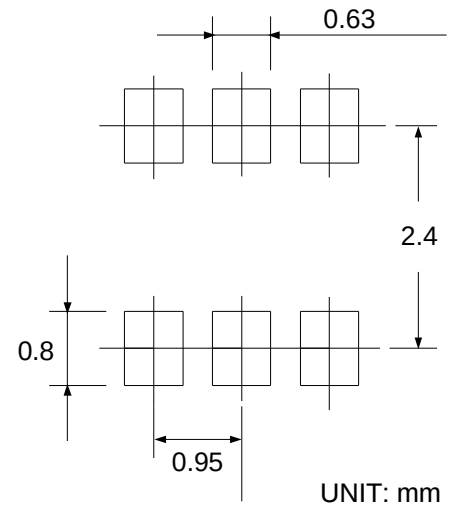


SYMBOL	SOT-23-6			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	-	1.25	-	0.049
A1	0.00	0.05	0.000	0.002
A2	0.90	1.20	0.035	0.047
b	0.30	0.50	0.012	0.020
c	0.08	0.22	0.003	0.009
D	2.70	3.10	0.106	0.122
E	2.60	3.00	0.102	0.118
E1	1.40	1.80	0.055	0.071
e	0.95 BSC		0.037 BSC	
e1	1.90 BSC		0.075 BSC	
L	0.30	0.60	0.012	0.024
θ	0°	8°	0°	8°

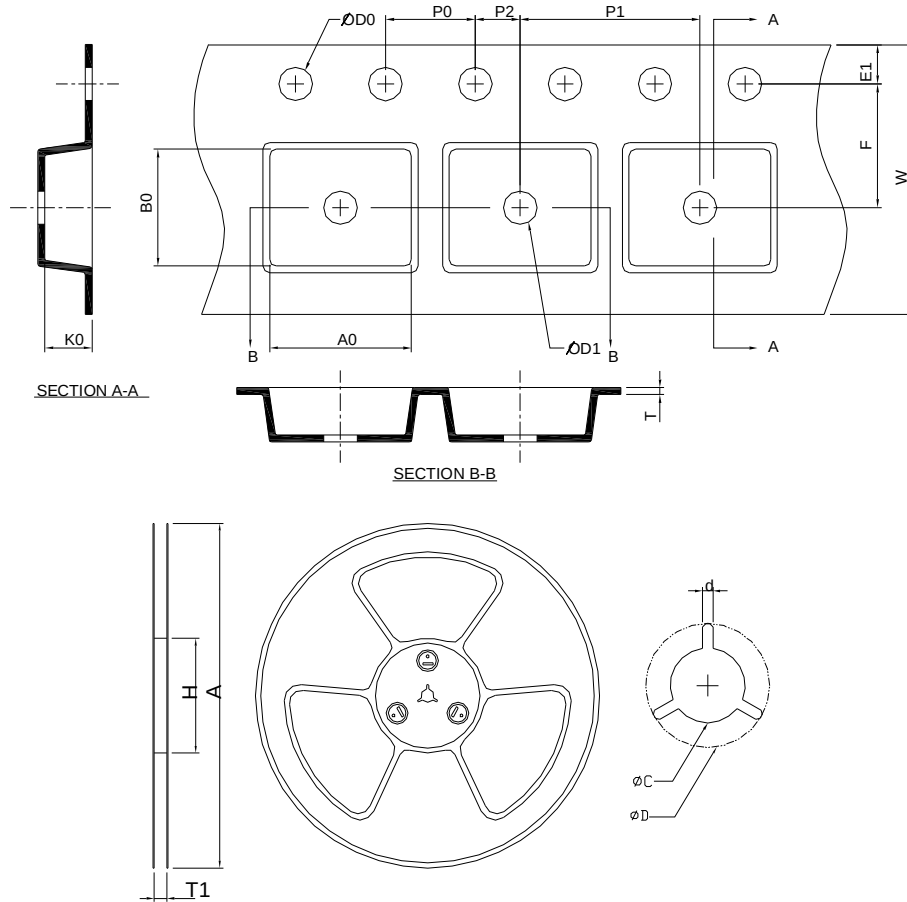
Note : 1. Follow JEDEC TO-178 AB.

2. Dimension D and E1 do not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 10 mil per side.

RECOMMENDED LAND PATTERN



Carrier Tape & Reel Dimensions

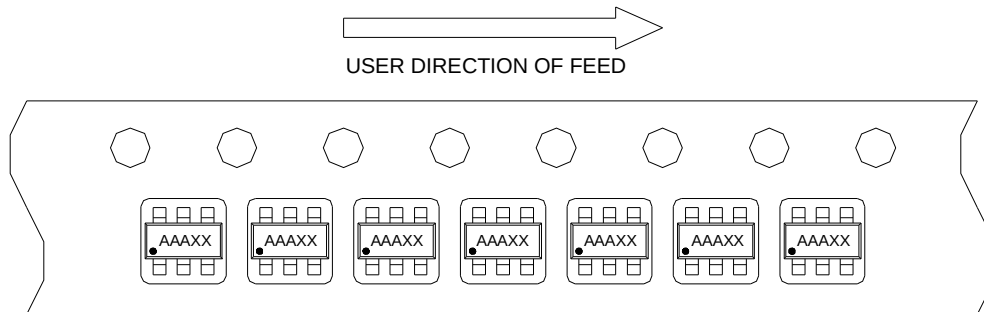


Application	A	H	T1	C	d	D	W	E1	F
SOT-23-6	178.0±2.00	50 MIN.	8.4+2.00 -0.00	13.0+0.50 -0.20	1.5 MIN.	20.2 MIN.	8.0±0.30	1.75±0.10	3.5±0.05
	P0	P1	P2	D0	D1	T	A0	B0	K0
	4.0±0.10	4.0±0.10	2.0±0.05	1.5+0.10 -0.00	1.0 MIN.	0.6+0.00 -0.40	3.20±0.20	3.10±0.20	1.50±0.20

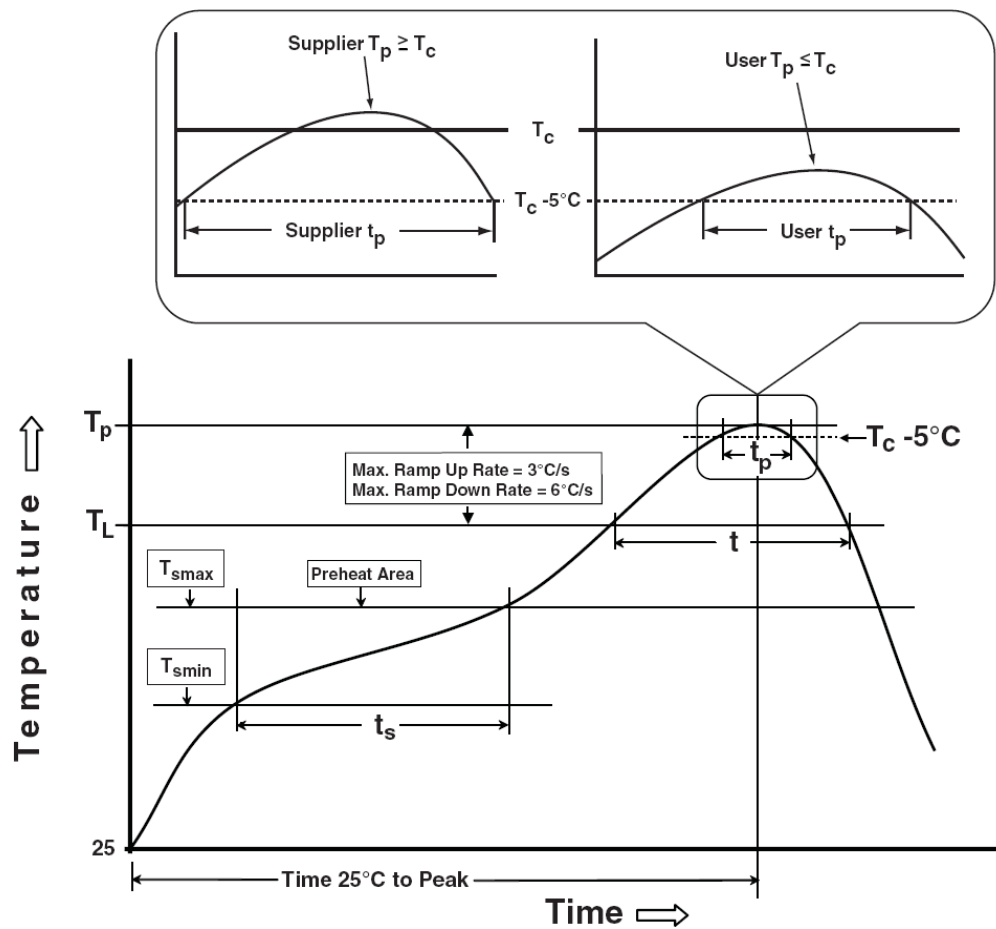
(mm)

Taping Direction Information

SOT-23-6



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} to T_{smax}) (t_s)	100 °C 150 °C 60-120 seconds	150 °C 200 °C 60-120 seconds
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 60-150 seconds	217 °C 60-150 seconds
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 (T_p) is defined as a supplier minimum and a user maximum.		
** Tolerance for time at peak profile temperature (t_p) is defined as a supplier minimum and a user maximum.		

Table 1. SnPb Eutectic Process – Classification Temperatures (T_c)

Package Thickness	Volume mm ³ <350	Volume mm ³ ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

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

Package Thickness	Volume mm ³ <350	Volume mm ³ 350-2000	Volume mm ³ >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 mm – 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
SOLDERABILITY	JESD-22, B102	5 Sec, 245°C
HTRB	JESD-22, A108	1000 Hrs, 80% of VDS max @ T_{jmax}
HTGB	JESD-22, A108	1000 Hrs, 100% of VGS max @ T_{jmax}
PCT	JESD-22, A102	168 Hrs, 100%RH, 2atm, 121°C
TCT	JESD-22, A104	500 Cycles, -65°C~150°C

Customer Service

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