

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Rating	Unit
Common Ratings			
V_{DSS}	Drain-Source Voltage	-60	V
V_{GSS}	Gate-Source Voltage	± 20	
T_J	Maximum Junction Temperature	150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to 150	
I_S	Diode Continuous Forward Current	$T_A=25^\circ\text{C}$	A
I_D^*	Continuous Drain Current	$T_A=25^\circ\text{C}$	A
		$T_A=70^\circ\text{C}$	
I_{DM}^a	Pulsed Drain Current	$T_A=25^\circ\text{C}$	A
P_D	Maximum Power Dissipation	$T_A=25^\circ\text{C}$	W
		$T_A=70^\circ\text{C}$	
$R_{\theta JA}^c$	Thermal Resistance-Junction to Ambient	$t \leq 10\text{s}$	$^\circ\text{C/W}$
		Steady State	
I_{AS}^b	Avalanche Current, Single pulse	$L=0.5\text{mH}$	A
E_{AS}^b	Avalanche Energy, Single pulse	$L=0.5\text{mH}$	mJ

Note * : $t \leq 10\text{s}$.

Note a : Pulse width is limited by maximum junction temperature.

Note b : UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature $T_J=25^\circ\text{C}$).

Note c : Surface Mounted on 1in^2 pad area.

Electrical Characteristics (T_A = 25°C Unless Otherwise Noted)

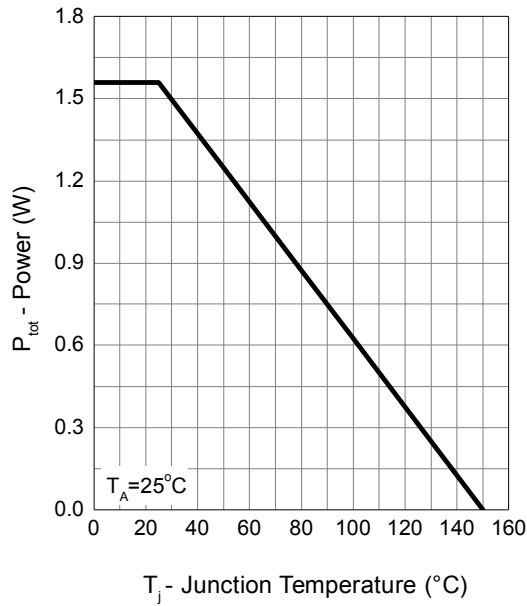
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	-60	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-48V, V _{GS} =0V T _J =85°C	-	-	1 30	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	-1	-2	-3	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±10	uA
R _{DS(ON)} ^d	Drain-Source On-state Resistance	V _{GS} =-10V, I _{DS} = -1.8A V _{GS} =-4.5V, I _{DS} = -1.4A	- -	180 220	225 300	mΩ mΩ
Diode Characteristics						
V _{SD} ^d	Diode Forward Voltage	I _{SD} =-1A, V _{GS} =0V	-0.5	-0.8	-1	V
t _{rr}	Reverse Recovery Time	I _{SD} =-1.8A,	-	20	-	ns
Q _{rr}	Reverse Recovery Charge	di _{SD} /dt=100A/μs	-	20	-	nC
Dynamic Characteristics ^d						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	-	7	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-30V, Frequency=1.0MHz	-	290	380	pF
C _{oss}	Output Capacitance		-	31	-	
C _{rss}	Reverse Transfer Capacitance		-	17	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =-30V, R _L =-30Ω, I _{DS} =-1A, V _{GEN} =-10V, R _G =6Ω	-	7	13	ns
t _r	Turn-on Rise Time		-	5	9	
t _{d(OFF)}	Turn-off Delay Time		-	17	31	
t _f	Turn-off Fall Time		-	8	15	
Gate Charge Characteristics ^e						
Q _g	Total Gate Charge	V _{DS} =-30V, V _{GS} =-4.5V, I _{DS} =-1.8A	-	3.5	-	nC
Q _g	Total Gate Charge	V _{DS} =-30V, V _{GS} =-10V, I _{DS} =-1.8A	-	7.2	10	
Q _{gs}	Gate-Source Charge		-	1.3	-	
Q _{gd}	Gate-Drain Charge		-	1.4	-	

Note d : Pulse test; pulse width≤300μs, duty cycle≤2%.

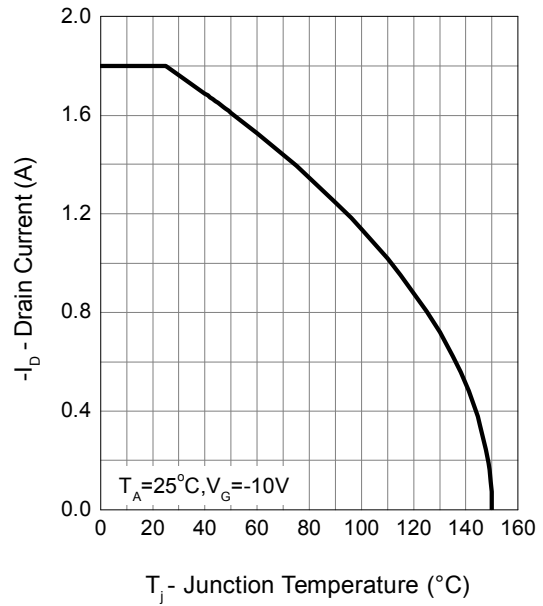
Note e : Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

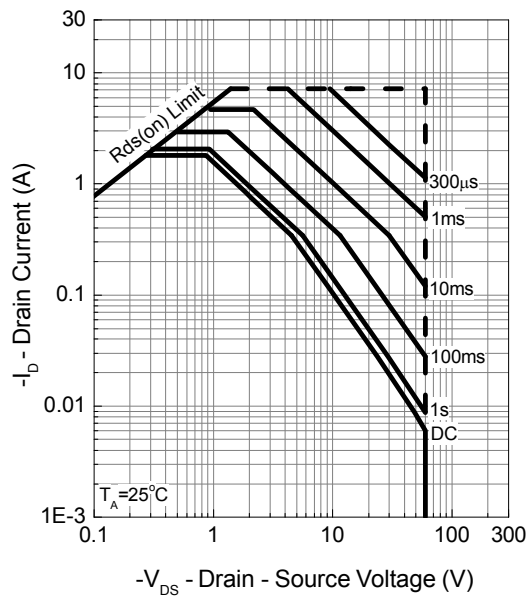
Power Dissipation



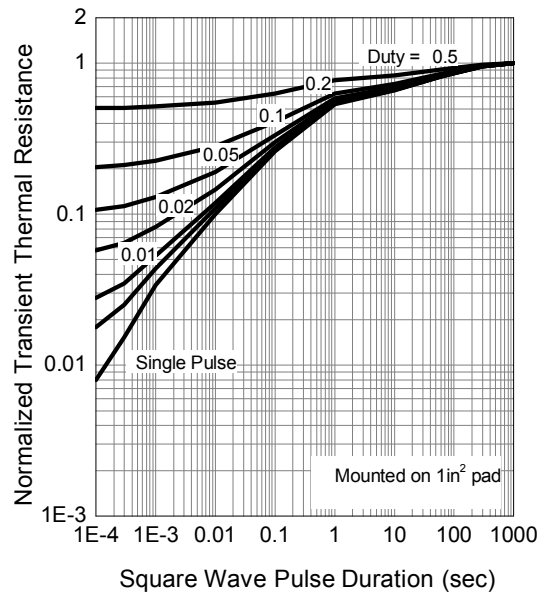
Drain Current



Safe Operation Area

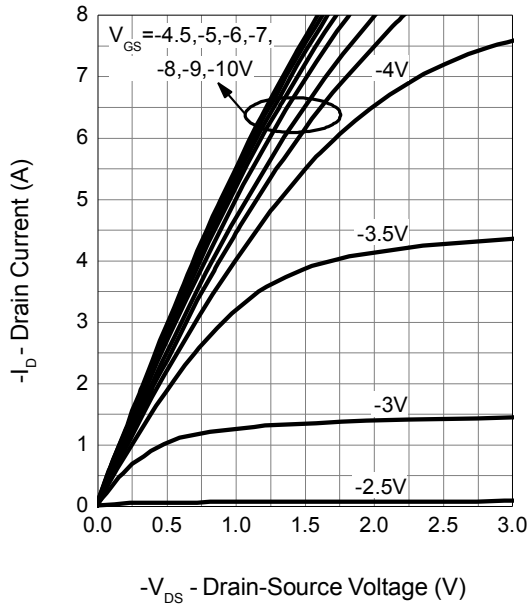


Thermal Transient Impedance

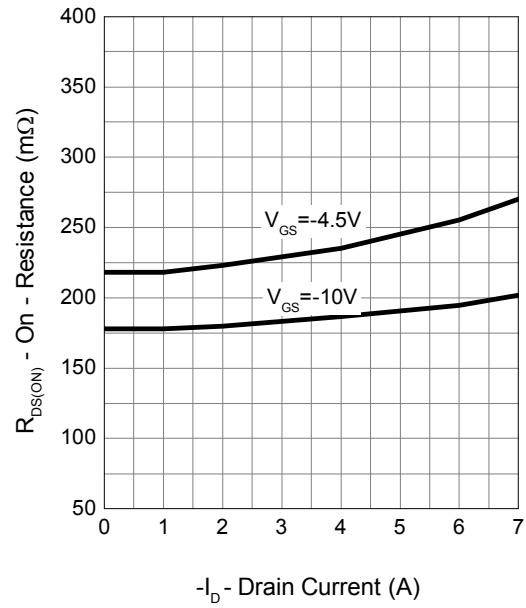


Typical Operating Characteristics (Cont.)

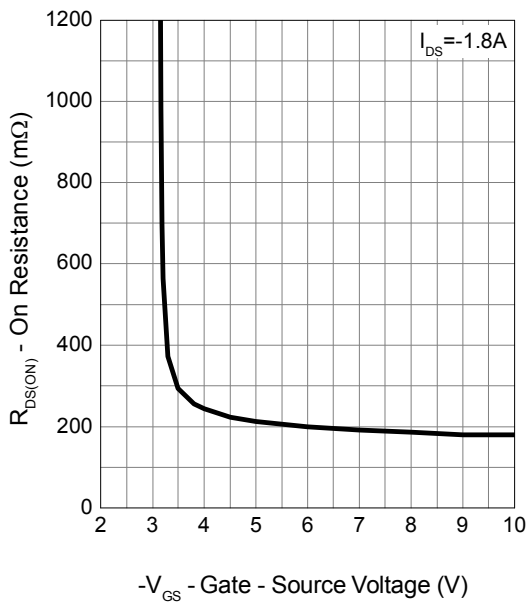
Output Characteristics



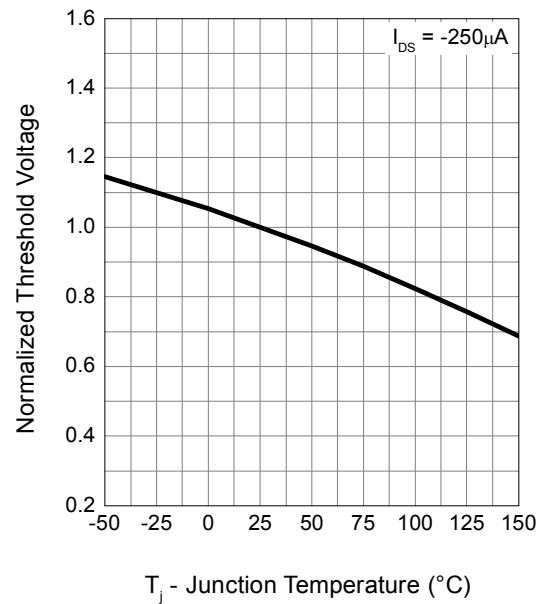
Drain-Source On Resistance



Gate-Source On Resistance

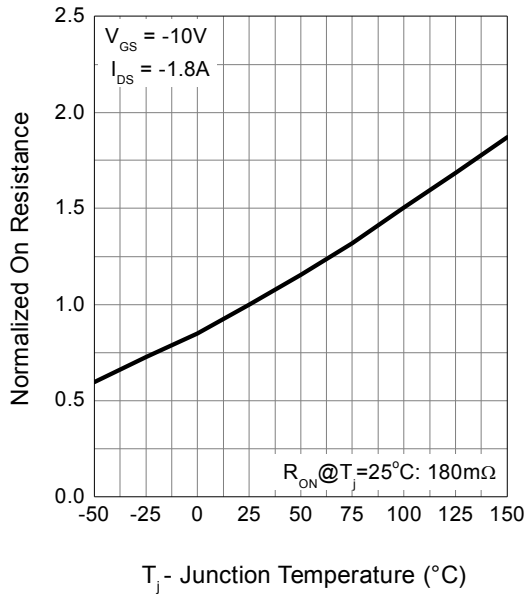


Gate Threshold Voltage

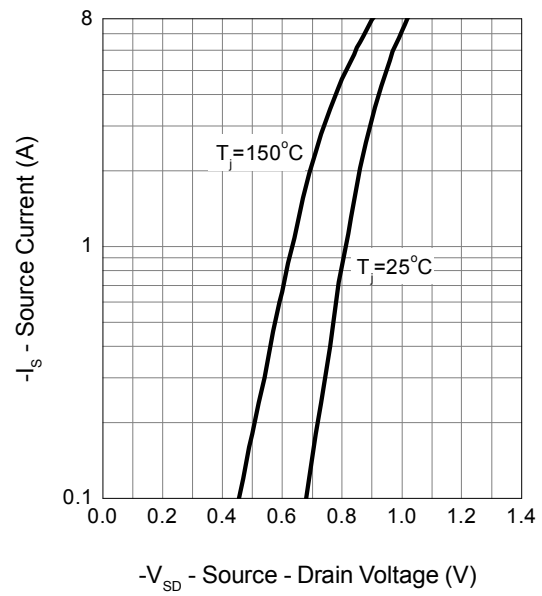


Typical Operating Characteristics (Cont.)

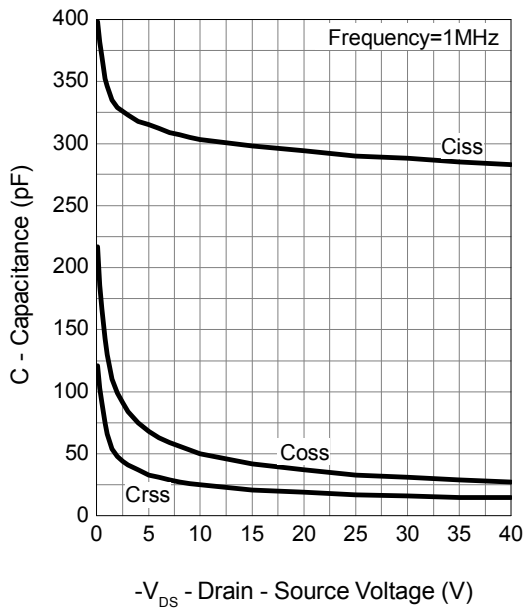
Drain-Source On Resistance



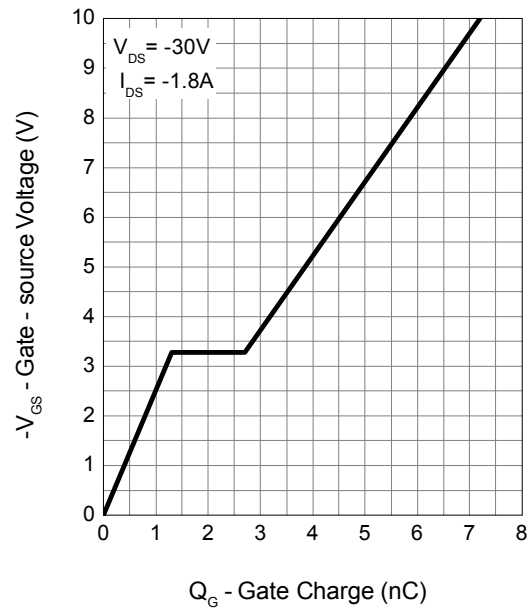
Source-Drain Diode Forward



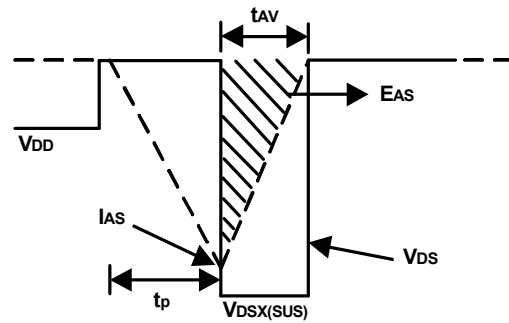
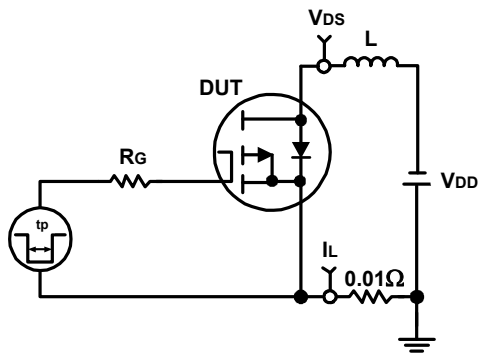
Capacitance



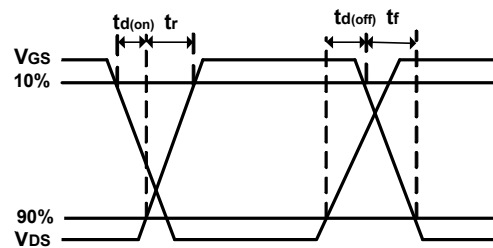
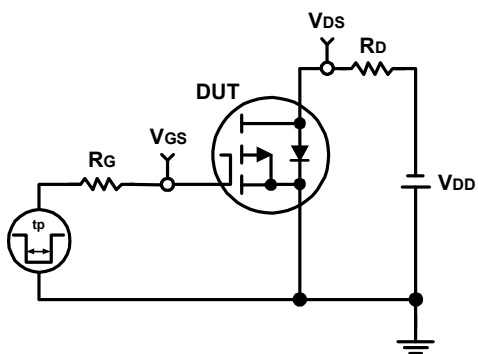
Gate Charge



Avalanche Test Circuit and Waveforms



Switching Time Test Circuit and Waveforms



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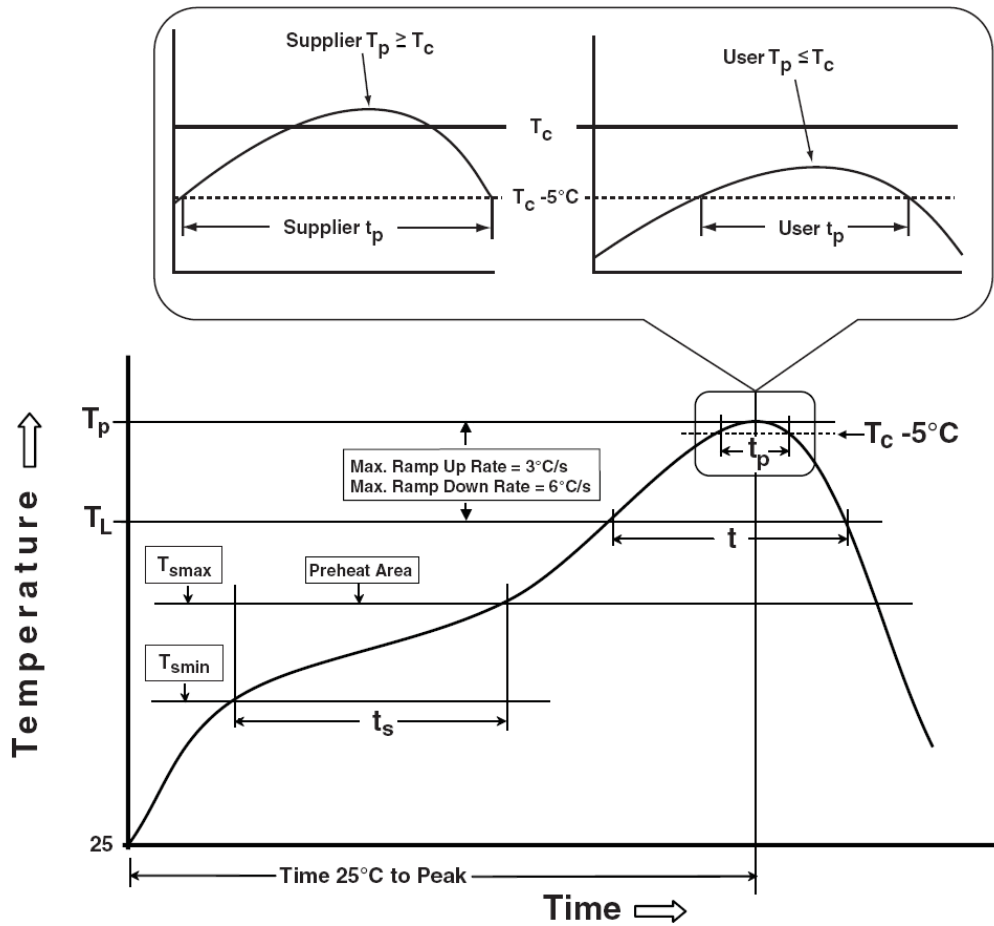
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Classification Profile



Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak		
Temperature min (T_{smin})	100 °C	150 °C
Temperature max (T_{smax})	150 °C	200 °C
Time (T_{smin} to T_{smax}) (t_s)	60-120 seconds	60-120 seconds
Average ramp-up rate (T_{smax} to T_p)	3 °C/second max.	3°C/second max.
Liquidous temperature (T_L)	183 °C	217 °C
Time at liquidous (t_L)	60-150 seconds	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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