

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

Symbol	Parameter		Rating	Unit
V_{DSS}	Drain-Source Voltage		20	V
V_{GSS}	Gate-Source Voltage		± 12	
I_{D}	Continue Drain Current	$T_A = 25^{\circ}\text{C}$	7.5	A
		$T_A = 70^{\circ}\text{C}$	6	
I_{DM}	Pulsed Drain Current	$T_A = 25^{\circ}\text{C}$	30	
I_{S}	Diode continuous forward current		1.5	A
T_{J}	Maximum Junction Temperature		150	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range		-55 to 150	
P_{D}	Maximum Power Dissipation	$T_A = 25^{\circ}\text{C}$	1.25	W
		$T_A = 70^{\circ}\text{C}$	0.8	
$R_{\theta\text{JA}}^*$	Thermal Resistance-Junction to Ambient		100	$^{\circ}\text{C/W}$

Note * : Surface Mounted on 1in^2 pad area, $t \leq 10\text{sec}$.

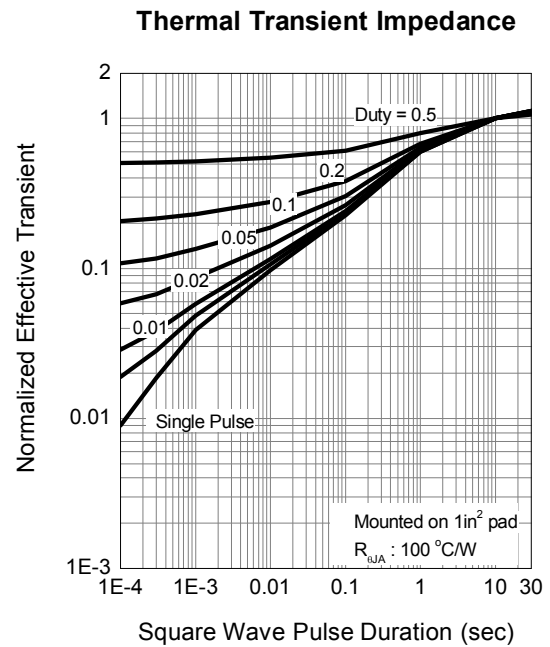
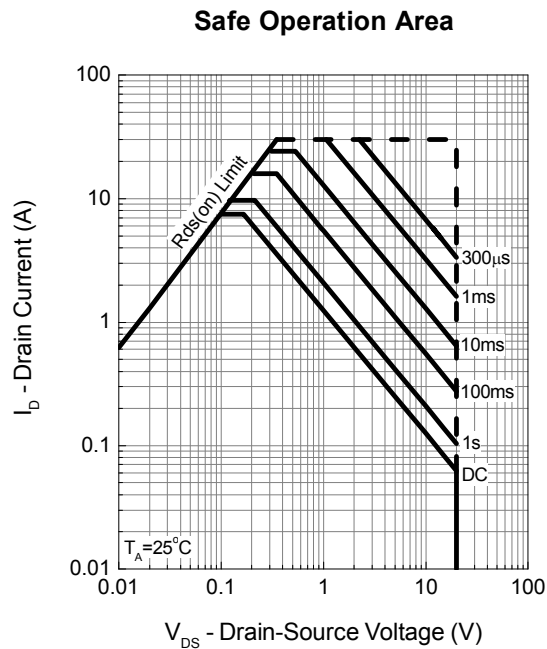
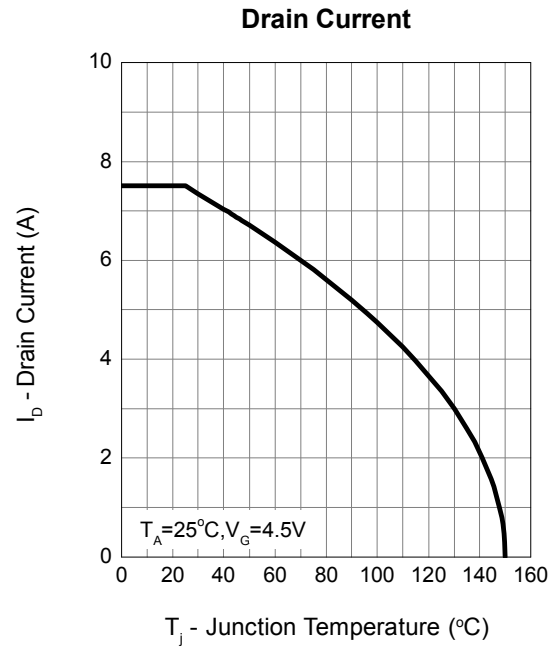
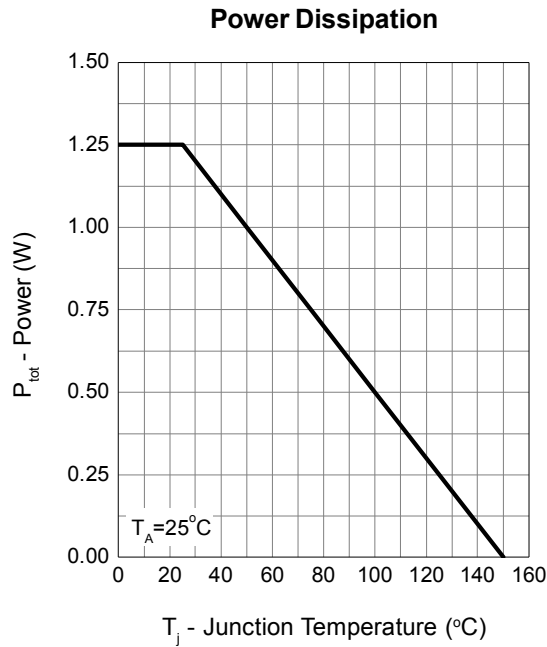
Electrical Characteristics ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	20	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =16V, V _{GS} =0V T _J =85°C	-	-	1 30	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	0.5	0.7	1.1	V
I _{GSS}	Gate Leakage Current	V _{GS} =±10V, V _{DS} =0V	-	-	±10	μA
R _{DS(ON)} ^a	Drain-Source On-state Resistance	V _{GS} =4.5V, I _{DS} =7.5A	-	11.5	14.5	mΩ
		V _{GS} =4V, I _{DS} =7A	-	12	15.5	
		V _{GS} =3.1V, I _{DS} =6A	-	13	17	
		V _{GS} =2.5V, I _{DS} =5A	-	14.5	20	
Diode Characteristics						
V _{SD} ^a	Diode Forward Voltage	I _{SD} =1A, V _{GS} =0V	-	0.7	1.3	V
t _{rr}	Reverse Recovery Time	I _{SD} =7.5A, dI _{SD} /dt=100A/μs	-	10	-	nS
Q _{rr}	Reverse Recovery Charge		-	3.5	-	nC
Dynamic Characteristics ^b						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	-	8	-	Ω
C _{iSS}	Input Capacitance	V _{GS} =0V, V _{DS} =10V, Frequency=1.0MHz	-	892	-	pF
C _{oss}	Output Capacitance		-	148	-	
C _{rss}	Reverse Transfer Capacitance		-	119	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =10V, R _L =10Ω, I _{DS} =1A, V _{GEN} =4.5V, R _G =6Ω	-	9	16	ns
t _r	Turn-on Rise Time		-	13	23	
t _{d(OFF)}	Turn-off Delay Time		-	55	99	
t _f	Turn-off Fall Time		-	36	65	
Gate Charge Characteristics ^b						
Q _g	Total Gate Charge	V _{DS} =10V, V _{GS} =4.5V, I _{DS} =7.5A	-	9.8	12.8	nC
Q _{gs}	Gate-Source Charge		-	0.5	-	
Q _{gd}	Gate-Drain Charge		-	3.6	-	

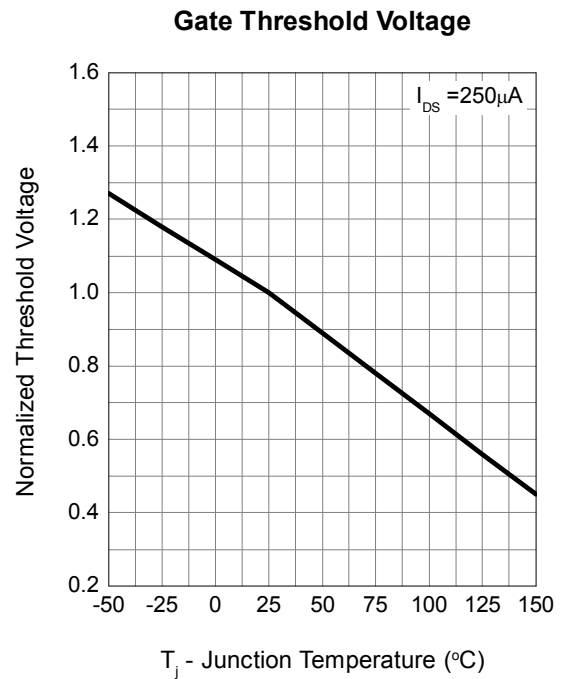
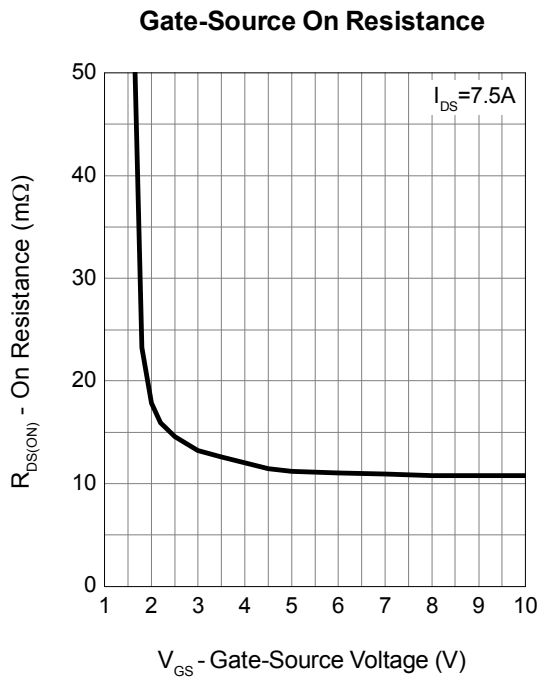
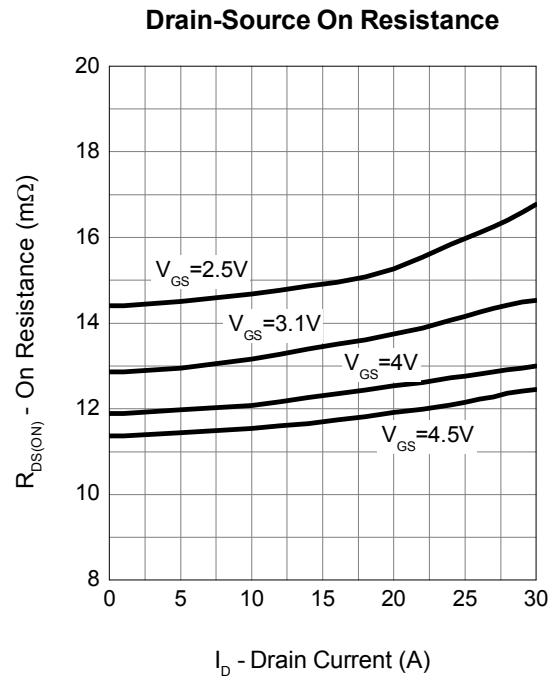
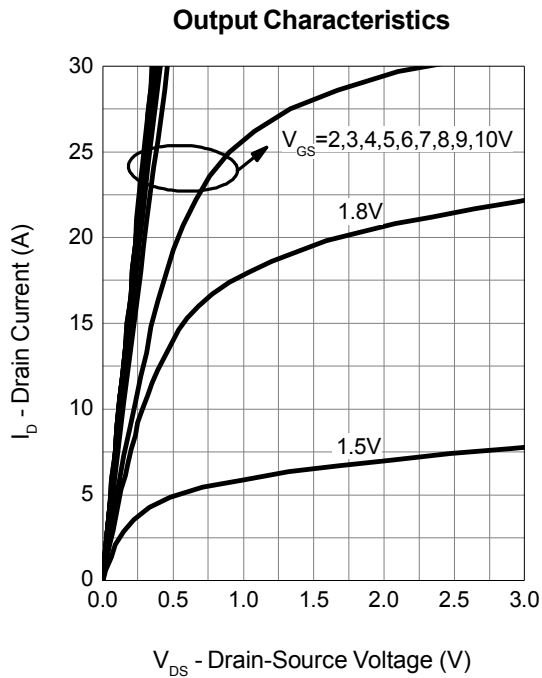
Note a : Pulse test ; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

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

Typical Operating Characteristics

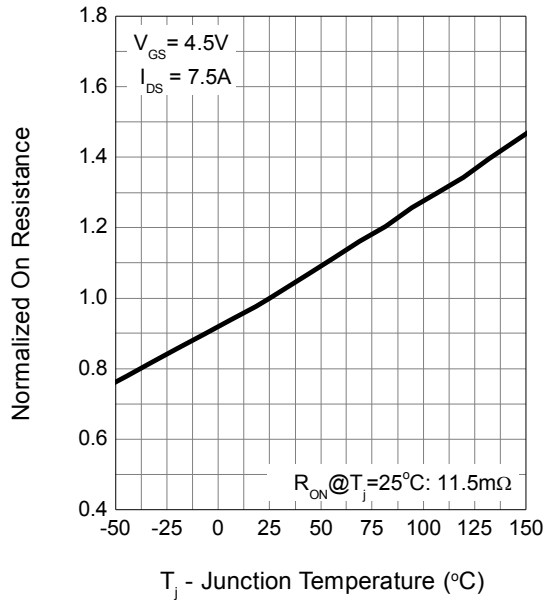


Typical Operating Characteristics (Cont.)

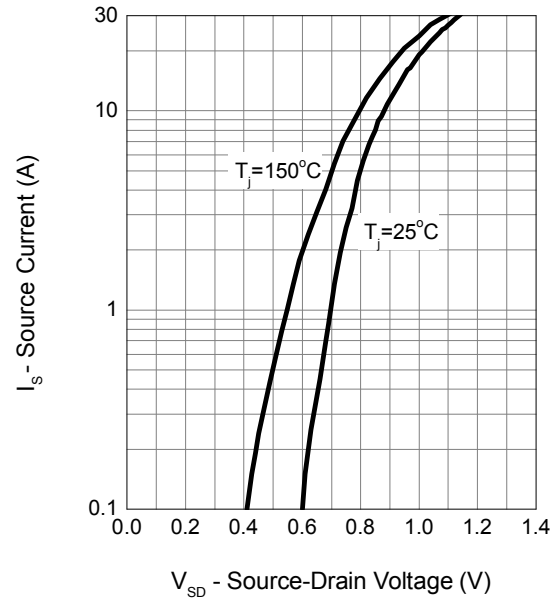


Typical Operating Characteristics (Cont.)

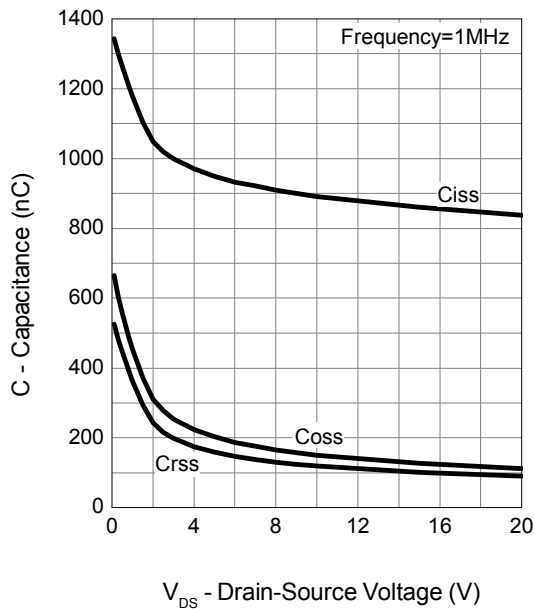
Drain-Source On Resistance



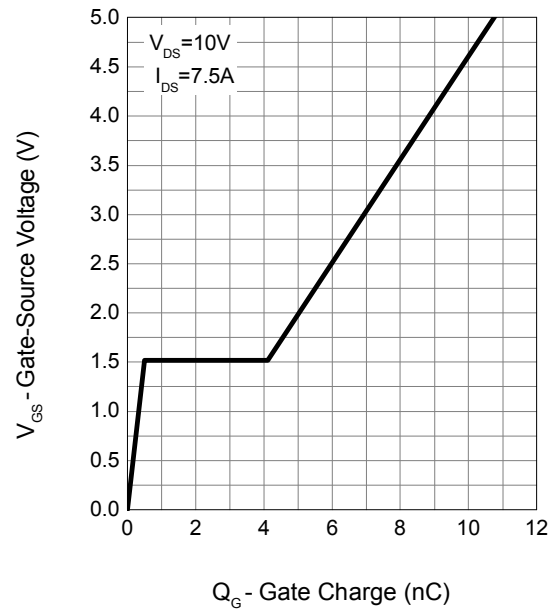
Source-Drain Diode Forward



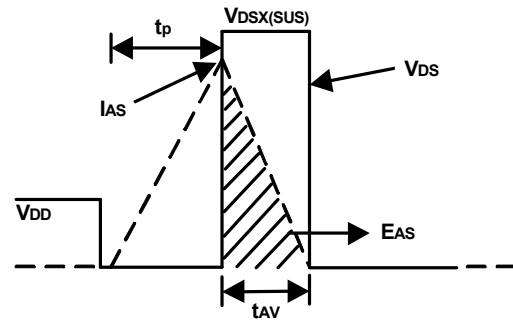
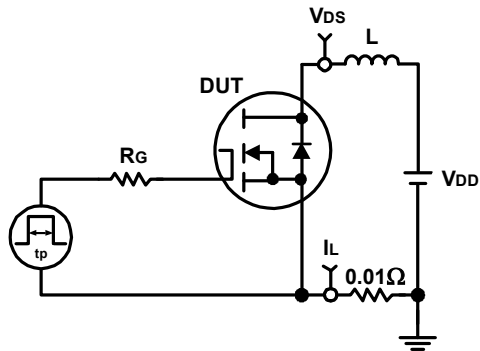
Capacitance



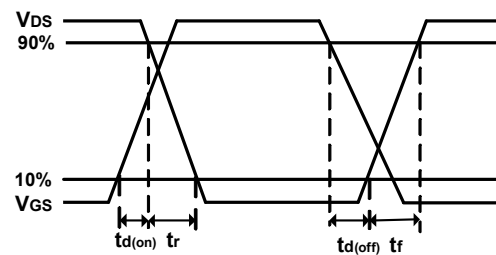
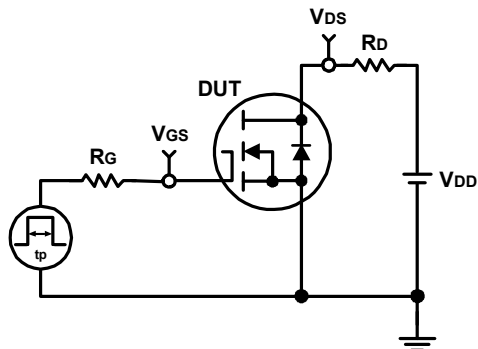
Gate Charge



Avalanche Test Circuit and Waveforms



Switching Time Test Circuit and Waveforms



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The figure illustrates the temperature profile of a heat treatment process. The main graph plots Temperature (°C) against Time (min). The process starts at 25°C, rises through a preheat area, and reaches a peak temperature T_p . Key temperature levels include T_{smin} , T_{smax} , T_L , and $T_c - 5^\circ\text{C}$. Time intervals are defined as t_s (Soak Time), t (Total Time), and t_p (Peak Time). The maximum ramp up rate is 3°C/s and the maximum ramp down rate is 6°C/s . Two inset graphs show the temperature profiles for the Supplier and User, highlighting the difference in peak temperature and time.

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

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