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

Symbol	Parameter		Channel 1	Channel 2	Unit
Common Ratings					
V_{DSS}	Drain-Source Voltage		30		V
V_{GSS}	Gate-Source Voltage		± 20	± 12	V
T_J	Maximum Junction Temperature		150		$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range		-55 to 150		$^{\circ}\text{C}$
I_S	Diode Continuous Forward Current	$T_C=25^{\circ}\text{C}$	40	71	A
I_D	Continuous Drain Current	$T_C=25^{\circ}\text{C}$	79.6	100 ^a	A
		$T_C=100^{\circ}\text{C}$	50.3	93	
I_{DM}^{b}	Pulse Drain Current	$T_C=25^{\circ}\text{C}$	318	400	A
P_D	Maximum Power Dissipation	$T_C=25^{\circ}\text{C}$	54.3	78.1	W
		$T_C=100^{\circ}\text{C}$	21.7	31.3	
$R_{\theta\text{JC}}$	Thermal Resistance-Junction to Case	Steady State	2.3	1.6	$^{\circ}\text{C/W}$
I_D	Continuous Drain Current	$T_A=25^{\circ}\text{C}$	15	24	A
		$T_A=70^{\circ}\text{C}$	12	19.2	
I_{DM}^{b}	Pulse Drain Current	$T_A=25^{\circ}\text{C}$	60	96	A
P_D	Maximum Power Dissipation	$T_A=25^{\circ}\text{C}$	1.92	2.08	W
		$T_A=70^{\circ}\text{C}$	1.23	1.33	
$R_{\theta\text{JA}}^{\text{c}}$	Thermal Resistance-Junction to Ambient	$t \leq 10\text{s}$	30	28	$^{\circ}\text{C/W}$
		Steady State	65	60	
I_{AS}^{d}	Avalanche Current, Single pulse	$L=0.1\text{mH}$	21	41	A
E_{AS}^{d}	Avalanche Energy, Single pulse	$L=0.1\text{mH}$	21.1	84.1	mJ

Note a : Maximum continuous current is limited by bonding wire.

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

Note c : Surface mounted on 1in² pad area, steady state $t = 999\text{s}$.

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

Channel 1 Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Channel 1			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	30	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =24V, V _{GS} =0V	-	-	1	μA
		T _J =85°C	-	-	30	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	1.2	1.6	2.2	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)} ^e	Drain-Source On-state Resistance	V _{GS} =10V, I _{DS} =20A	-	4.3	5.2	mΩ
		T _J =125°C	-	6.5	-	
		V _{GS} =4.5V, I _{DS} =15A	-	6.3	8.2	
Gfs	Forward Transconductance	V _{DS} =5V, I _{DS} =15A	-	20.5	-	S
Diode Characteristics						
V _{SD} ^e	Diode Forward Voltage	I _{SD} =10A, V _{GS} =0V	-	0.8	1.1	V
t _{rr}	Reverse Recovery Time	I _{SD} =15A, dI _{SD} /dt=100A/μs	-	21.5	-	ns
t _a	Charge Time		-	10	-	
t _b	Discharge Time		-	11.5	-	
Q _{rr}	Reverse Recovery Charge		-	7.3	-	nC
Dynamic Characteristics ^f						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	-	1.7	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, Frequency=1.0MHz	-	750	975	pF
C _{oss}	Output Capacitance		-	330	-	
C _{rss}	Reverse Transfer Capacitance		-	30	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =15V, R _L =15Ω, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω	-	10	18	ns
t _r	Turn-on Rise Time		-	9.5	18	
t _{d(OFF)}	Turn-off Delay Time		-	20	36	
t _f	Turn-off Fall Time		-	17	31	
Gate Charge Characteristics ^f						
Q _g	Total Gate Charge	V _{DS} =15V, V _{GS} =10V, I _{DS} =20A	-	10	14	nC
Q _g	Total Gate Charge	V _{DS} =15V, V _{GS} =4.5V, I _{DS} =20A	-	4.9	-	
Q _{gth}	Threshold Gate Charge		-	1.5	-	
Q _{gs}	Gate-Source Charge		-	2.4	-	
Q _{gd}	Gate-Drain Charge		-	0.8	-	

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

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

Channel 2 Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

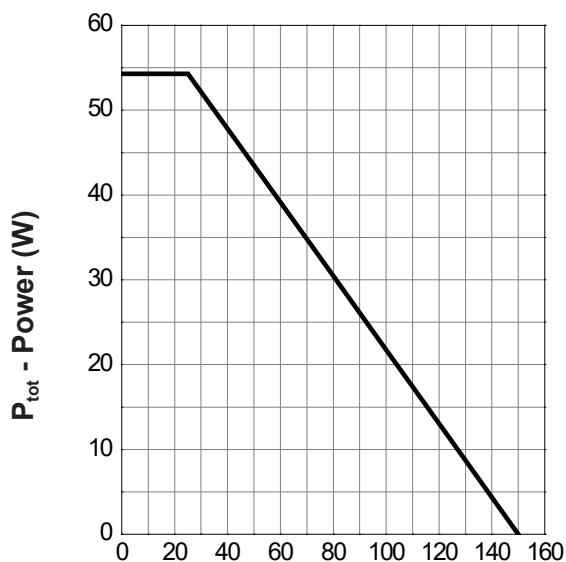
Symbol	Parameter	Test Conditions	Channel 2			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	30	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =24V, V _{GS} =0V	-	-	1	μA
		T _J =85°C	-	-	30	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	1.1	1.5	1.9	V
I _{GSS}	Gate Leakage Current	V _{GS} =±12V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)} ^e	Drain-Source On-state Resistance	V _{GS} =10V, I _{DS} =20A	-	1.9	2.3	mΩ
		T _J =125°C	-	2.7	-	
		V _{GS} =4.5V, I _{DS} =15A	-	2.3	3	
Gfs	Forward Transconductance	V _{DS} =5V, I _{DS} =15A	-	52	-	S
Diode Characteristics						
V _{SD} ^e	Diode Forward Voltage	I _{SD} =10A, V _{GS} =0V	-	0.75	1.1	V
t _{rr}	Reverse Recovery Time	I _{SD} =20A, dI _{SD} /dt=100A/μs	-	31	-	ns
t _a	Charge Time		-	16	-	
t _b	Discharge Time		-	15	-	
Q _{rr}	Reverse Recovery Charge		-	18	-	nC
Dynamic Characteristics ^f						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	-	0.85	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, Frequency=1.0MHz	-	3200	-	pF
C _{oss}	Output Capacitance		-	825	-	
C _{rss}	Reverse Transfer Capacitance		-	85	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =15V, R _L =15Ω, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω	-	17	31	ns
t _r	Turn-on Rise Time		-	10	18	
t _{d(OFF)}	Turn-off Delay Time		-	62	112	
t _f	Turn-off Fall Time		-	49	89	
Gate Charge Characteristics ^f						
Q _g	Total Gate Charge	V _{DS} =15V, V _{GS} =10V, I _{DS} =20A	-	50	70	nC
Q _g	Total Gate Charge	V _{DS} =15V, V _{GS} =4.5V, I _{DS} =20A	-	24	-	
Q _{gth}	Threshold Gate Charge		-	5	-	
Q _{gs}	Gate-Source Charge		-	6.7	-	
Q _{gd}	Gate-Drain Charge		-	6.2	-	

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

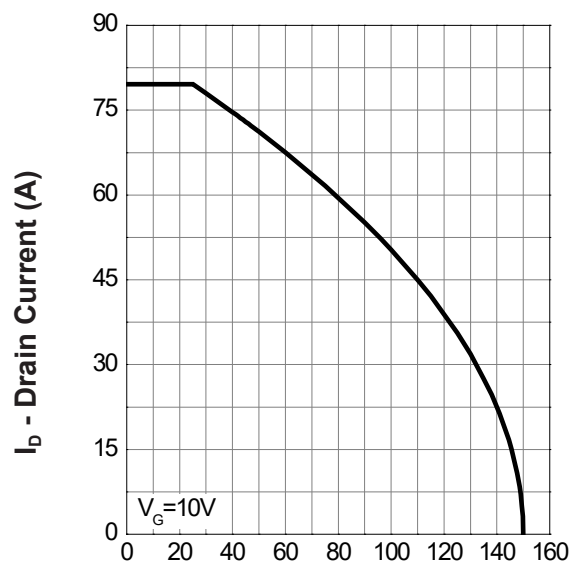
Note f : Guaranteed by design, not subject to production testing.

Channel 1 Typical Operating Characteristics

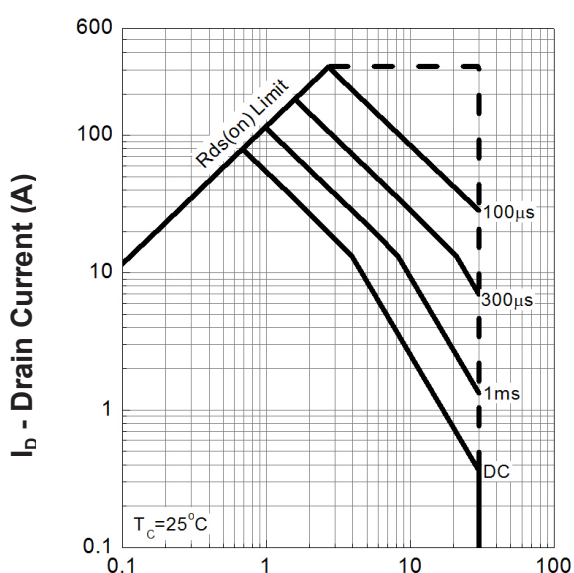
Power Dissipation

 T_c - Case Temperature ($^{\circ}\text{C}$)

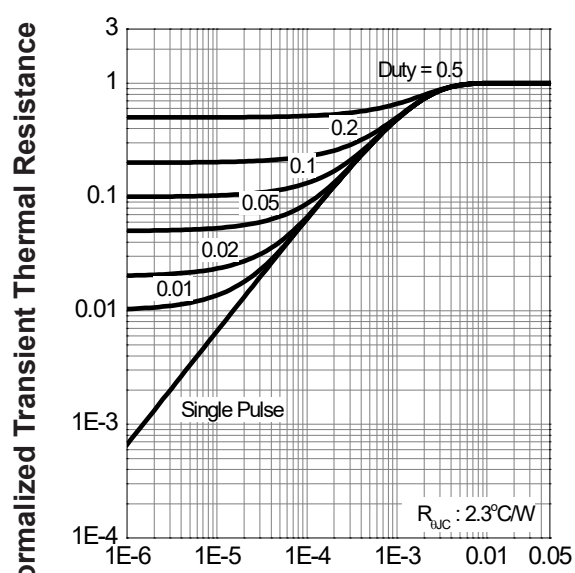
Drain Current

 T_c - Case Temperature ($^{\circ}\text{C}$)

Safe Operation Area

 V_{DS} - Drain - Source Voltage (V)

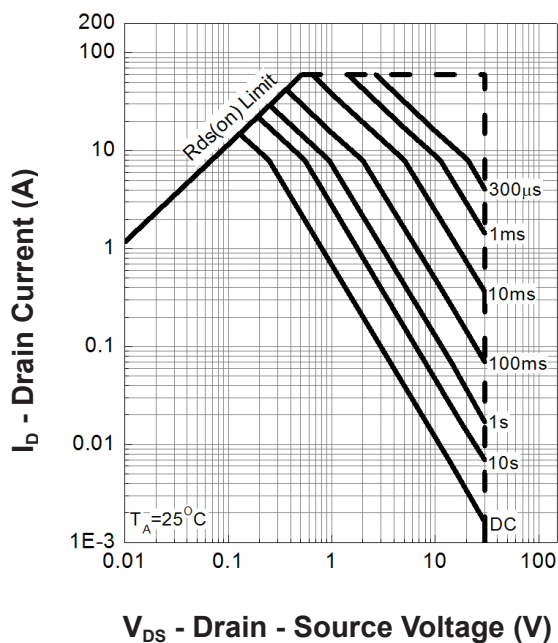
Thermal Transient Impedance



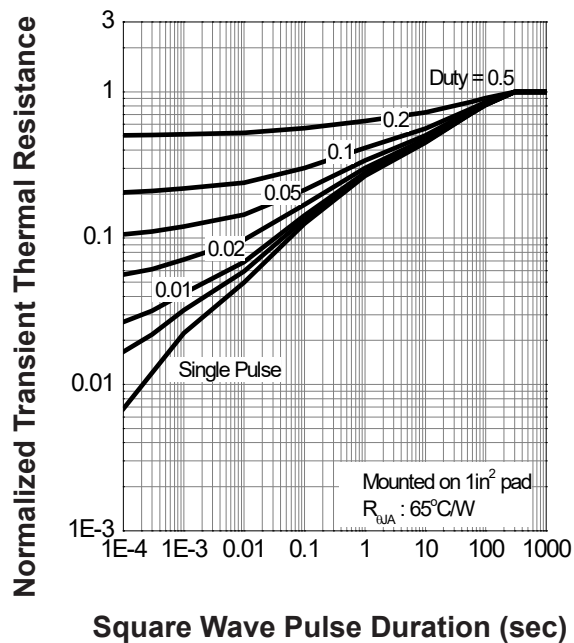
Square Wave Pulse Duration (sec)

Channel 1 Typical Operating Characteristics(Cont.)

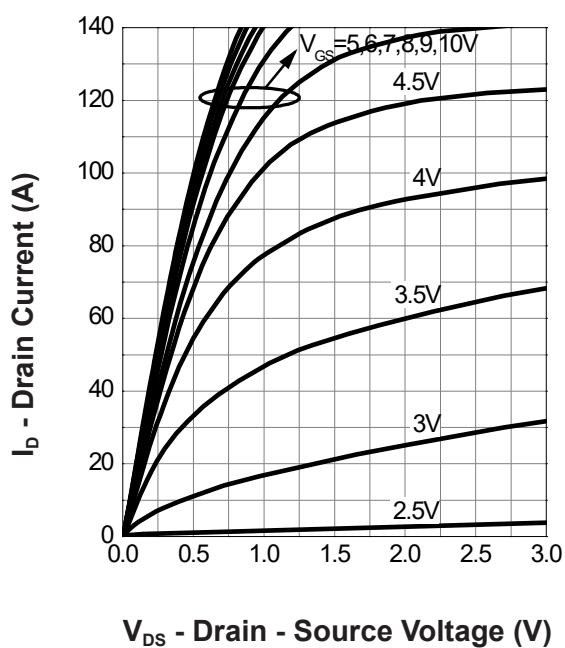
Safe Operation Area



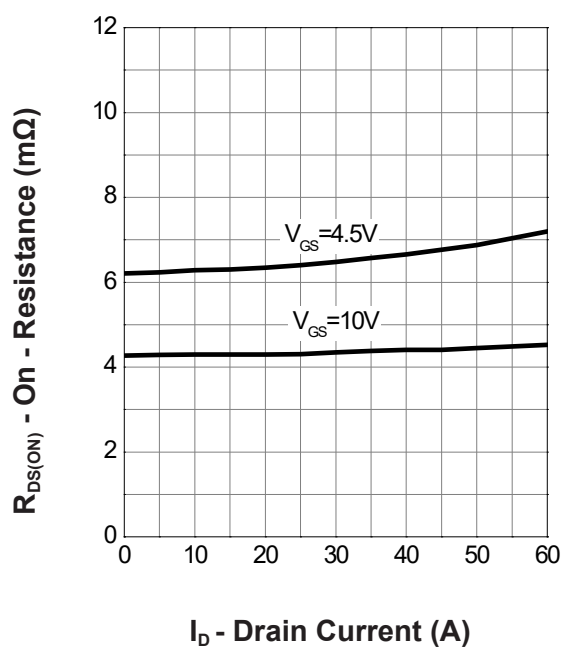
Thermal Transient Impedance



Output Characteristics

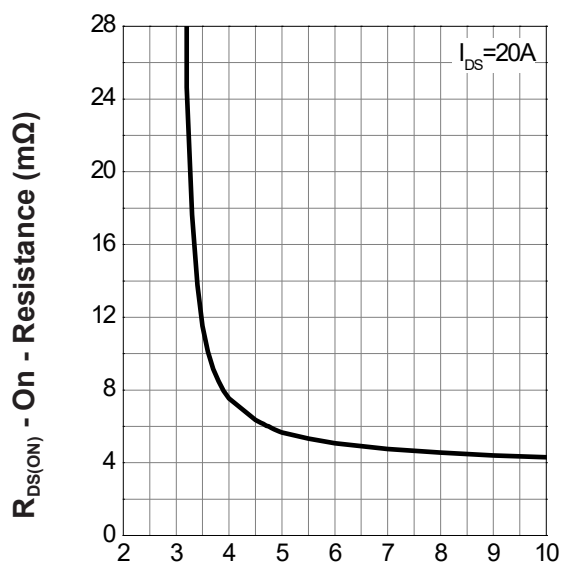


Drain-Source On Resistance

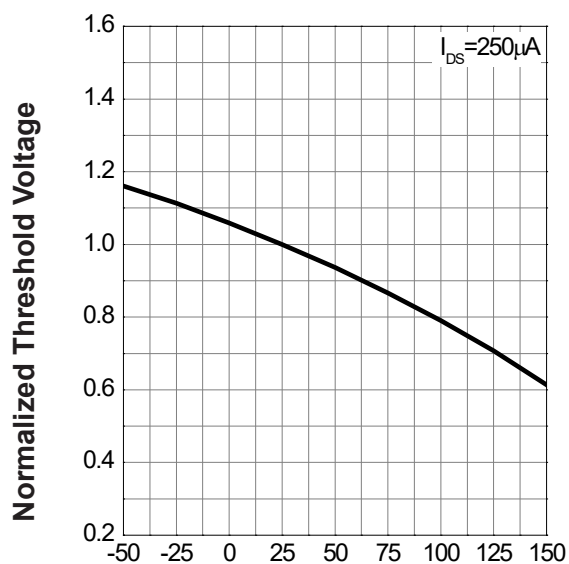


Channel 1 Typical Operating Characteristics(Cont.)

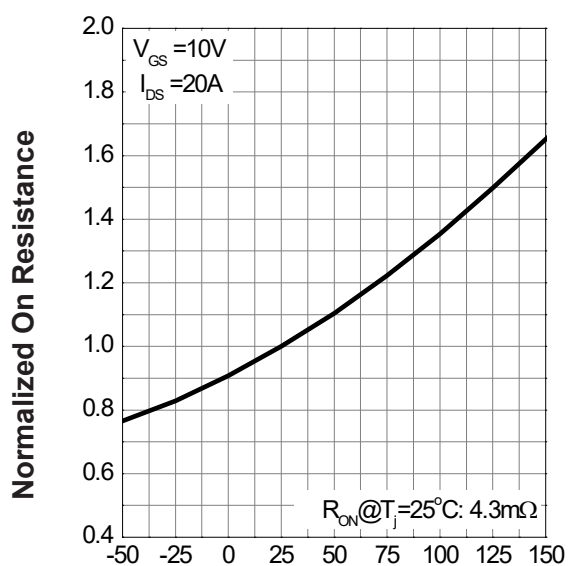
Gate-Source On Resistance

 V_{GS} - Gate - Source Voltage (V)

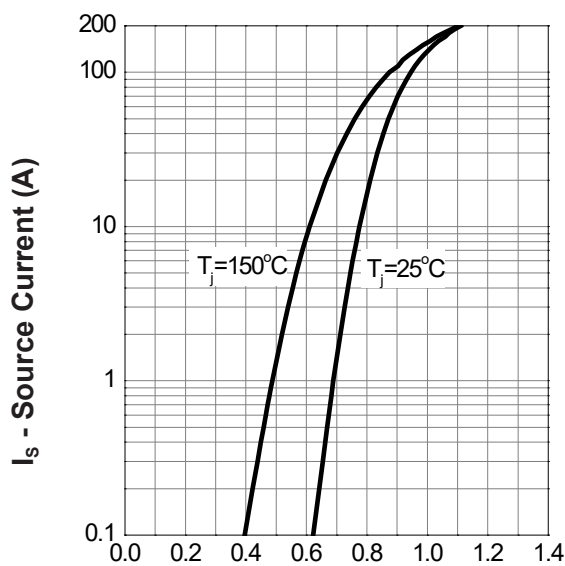
Gate Threshold Voltage

 T_J - Junction Temperature (°C)

Drain-Source On Resistance

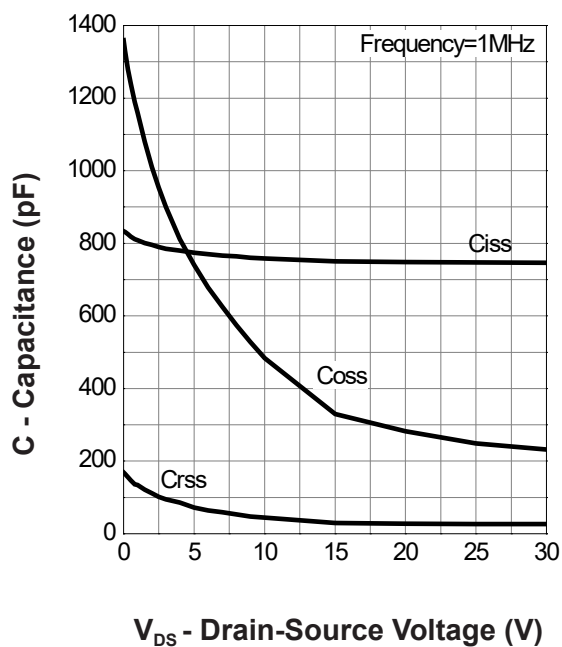
 T_J - Junction Temperature (°C)

Source-Drain Diode Forward

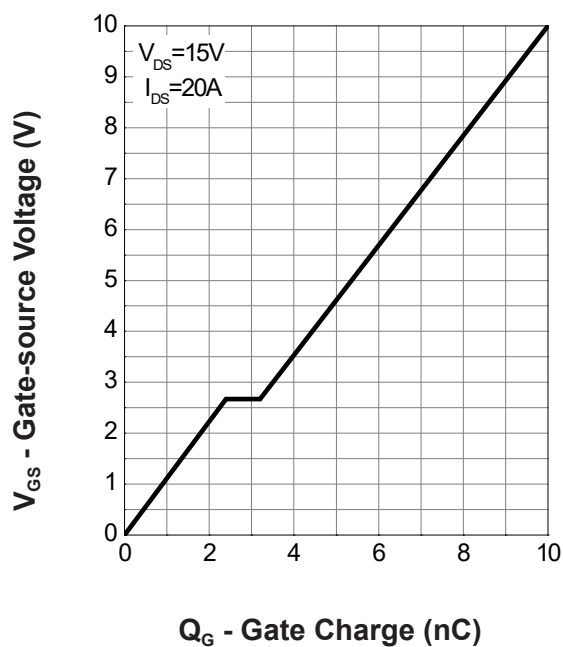
 V_{SD} - Source - Drain Voltage (V)

Channel 1 Typical Operating Characteristics(Cont.)

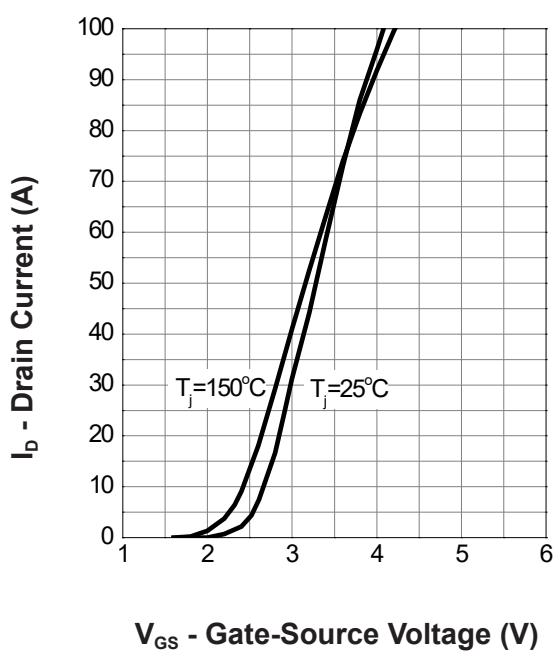
Capacitance



Gate Charge

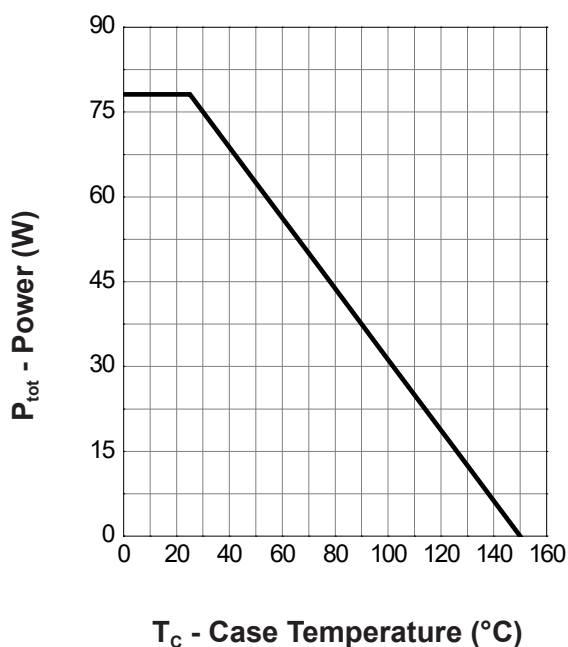


Transfer Characteristics

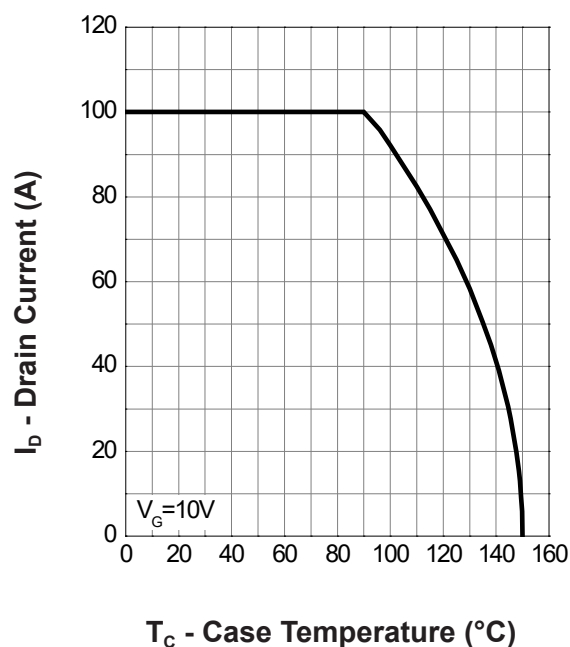


Channel 2 Typical Operating Characteristics

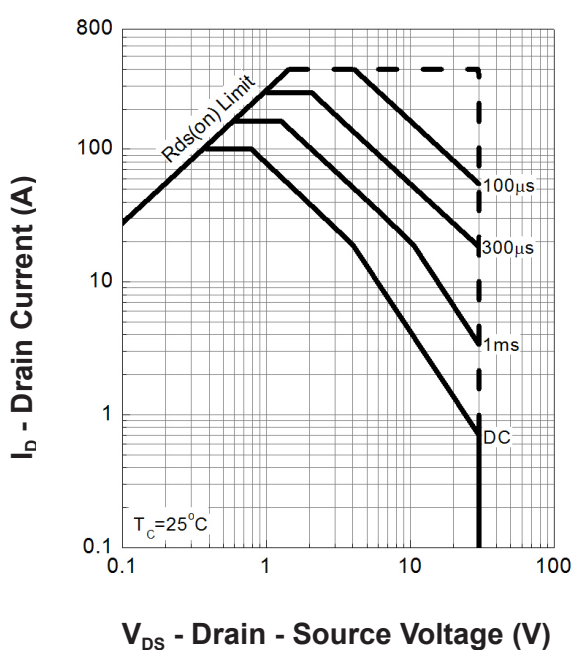
Power Dissipation



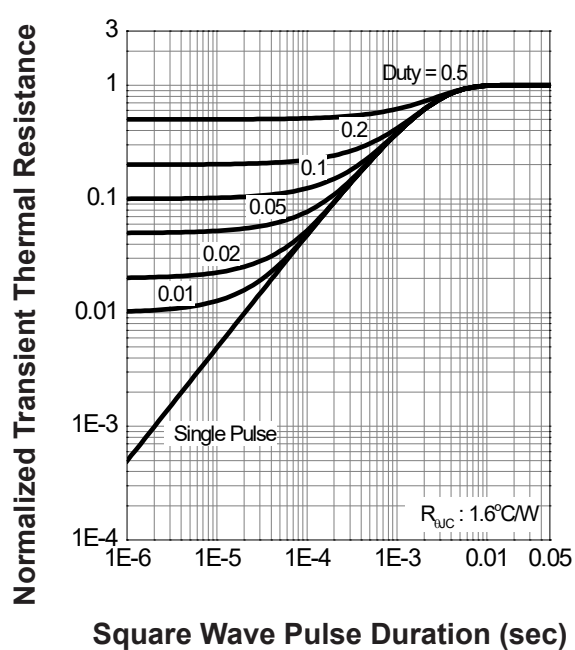
Drain Current



Safe Operation Area

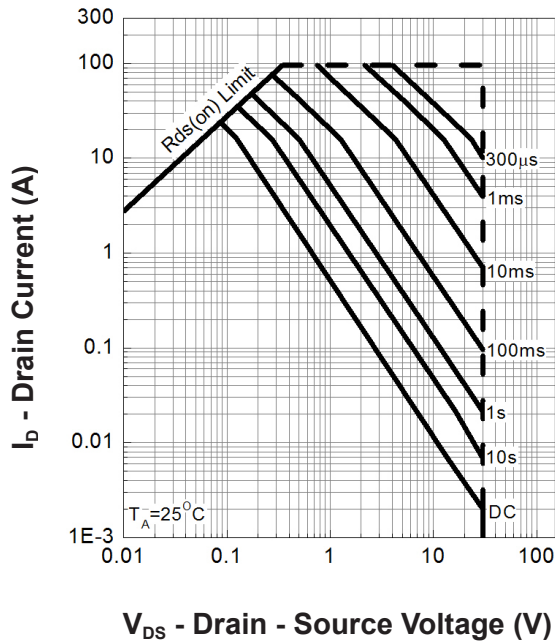


Thermal Transient Impedance

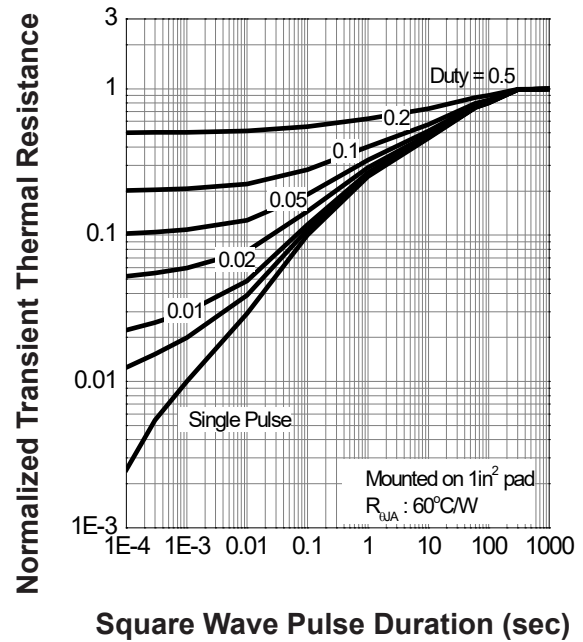


Channel 2 Typical Operating Characteristics(Cont.)

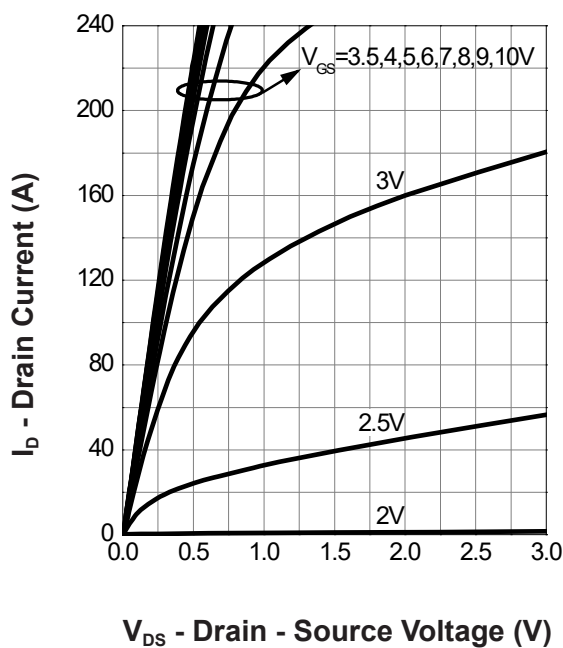
Safe Operation Area



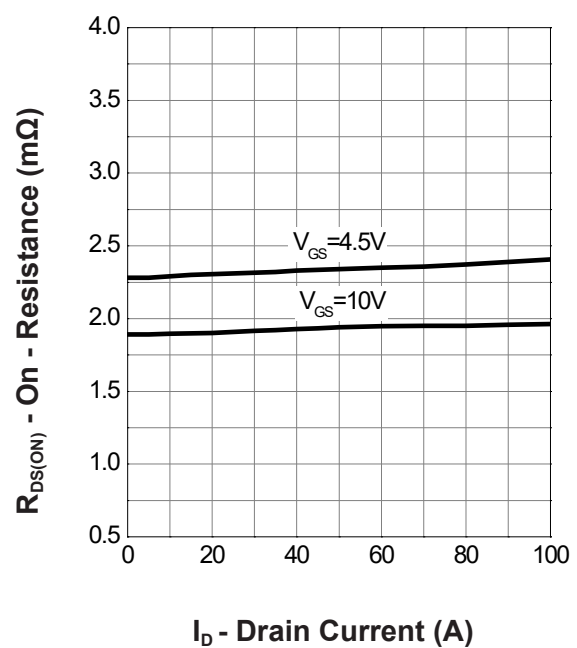
Thermal Transient Impedance



Output Characteristics

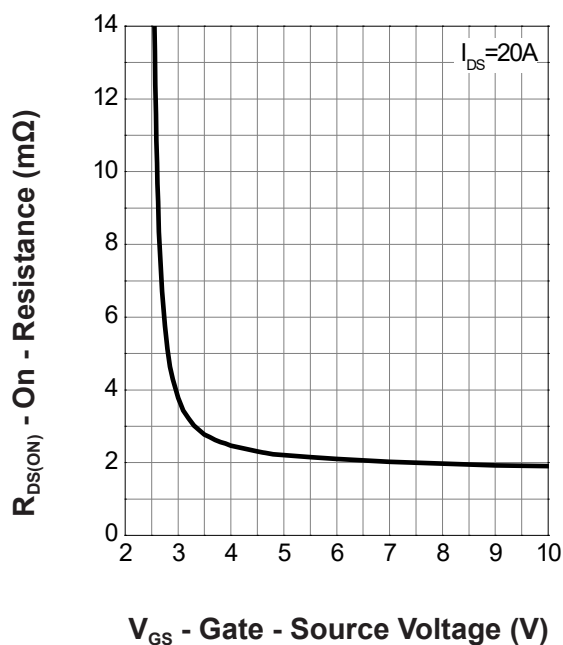


Drain-Source On Resistance

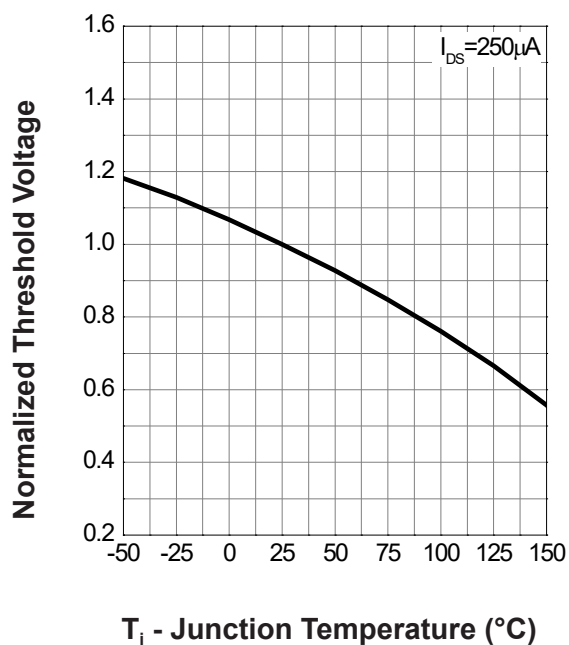


Channel 2 Typical Operating Characteristics(Cont.)

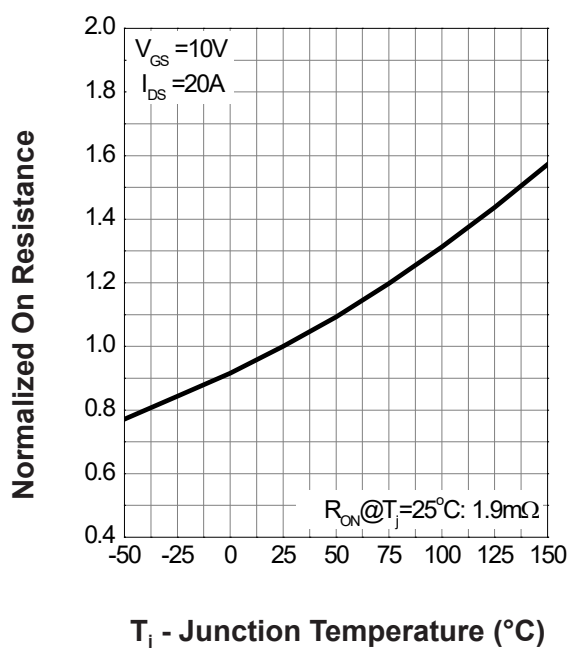
Gate-Source On Resistance



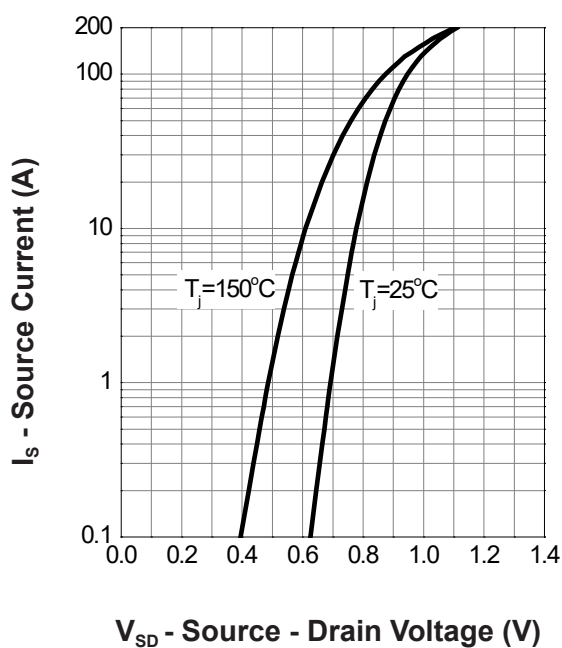
Gate Threshold Voltage



Drain-Source On Resistance

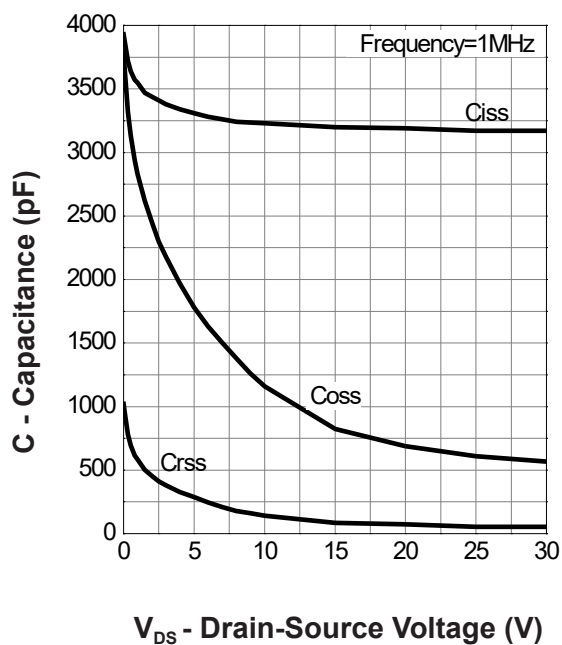


Source-Drain Diode Forward

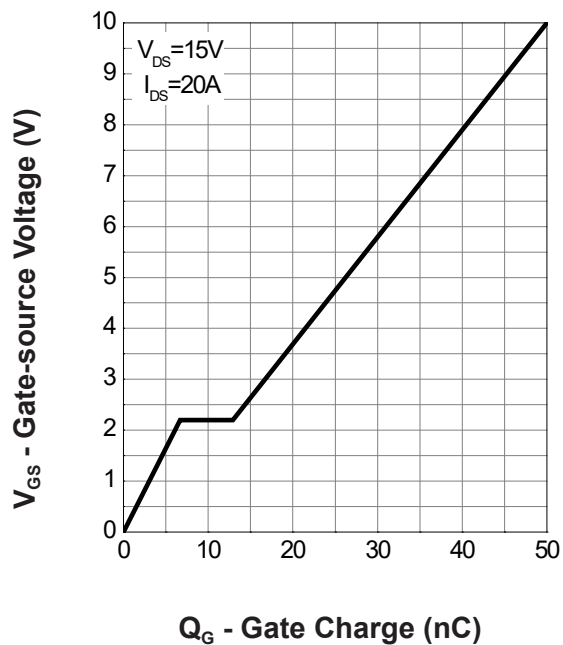


Channel 2 Typical Operating Characteristics(Cont.)

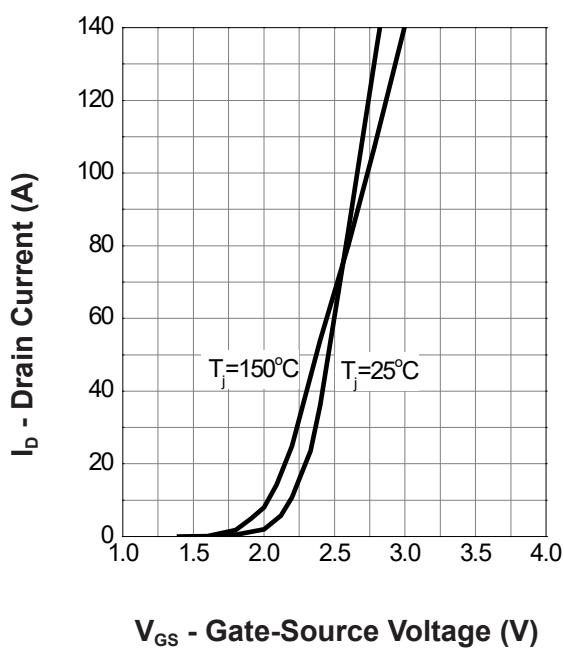
Capacitance



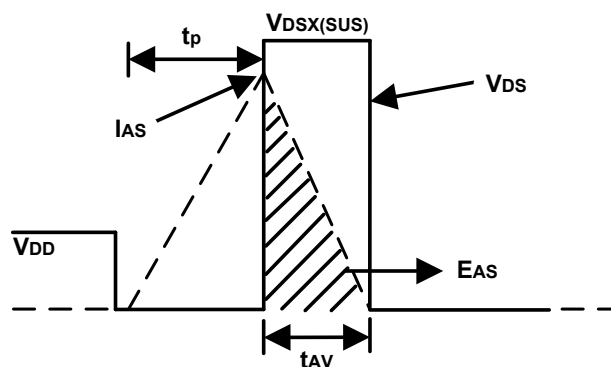
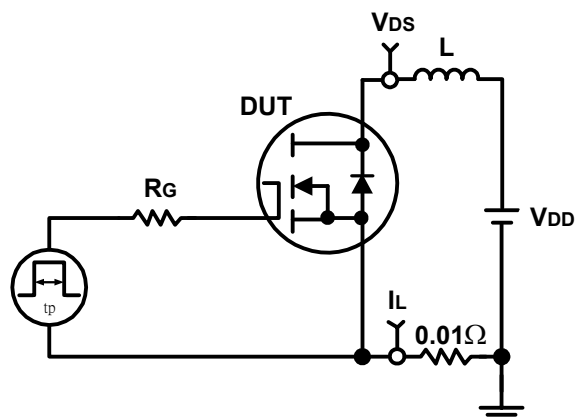
Gate Charge



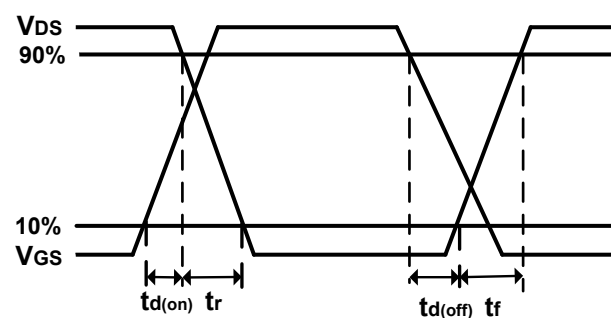
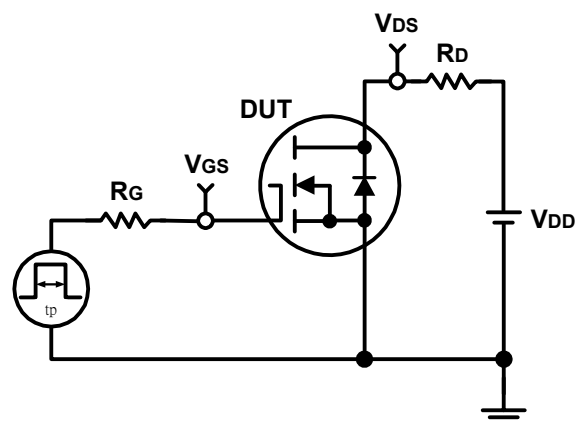
Transfer Characteristics



Avalanche Test Circuit and Waveforms



Switching Time Test Circuit and Waveforms



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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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