

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

Symbol	Parameter		N Channel	P Channel	Unit
Common Ratings					
V _{DSS}	Drain-Source Voltage		100	-100	V
V _{GSS}	Gate-Source Voltage		±20		
T _J	Maximum Junction Temperature		150		°C
T _{STG}	Storage Temperature Range		-55 to 150		
I _S	Diode Continuous Forward Current	T _A =25°C	2	-1	A
I _D	Continuous Drain Current	T _A =25°C	2.3	-1.6	A
		T _A =70°C	1.8	1.28	
I _{DM} ^a	Pulsed Drain Current	T _A =25°C	9.2	-6.4	A
P _D ^d	Maximum Power Dissipation	T _A =25°C	1.79	1.79	W
		T _A =70°C	1.1	1.1	
R _{θJA} ^b	Thermal Resistance-Junction to Ambient	t ≤ 10s	70		°C/W
		Steady State	120		°C/W
I _{AS} ^c	Avalanche Current, Single pulse	L=0.5mH	5	-7	A
E _{AS} ^c	Avalanche Energy, Single pulse	L=0.5mH	6.25	12	mJ

Note a : Pulse width limited by max. junction temperature.

Note b : $R_{\theta JA}$ steady state $t=999\text{s}$. $R_{\theta JA}$ is measured with the device mounted on 1in^2 , FR-4 board with 2oz. Copper.

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

Note d : $t < 10\text{s}$.

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

Symbol	Parameter	Test Conditions	N Channel			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	100	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =80V, 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	3	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±10	μA
R _{DS(ON)} ^e	Drain-Source On-state Resistance	V _{GS} =10V, I _{DS} =2.5A	-	135	162	mΩ
		V _{GS} =4.5V, I _{DS} =2A	-	140	182	mΩ
		V _{GS} =4.0V, I _{DS} =2A	-	145	203	mΩ
Diode Characteristics						
V _{SD} ^e	Diode Forward Voltage	I _{SD} =2A, V _{GS} =0V	-	0.8	1.3	V
t _{rr}	Reverse Recovery Time	I _{SD} =2.5A, dI _{SD} /dt=100A/μs	-	23	-	ns
Q _{rr}	Reverse Recovery Charge		-	26	-	nC
Dynamic Characteristics ^f						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	-	3	6	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =30V, Frequency=1.0MHz	-	440	572	pF
C _{oss}	Output Capacitance		-	30	-	
C _{rss}	Reverse Transfer Capacitance		-	16	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =30V, R _L =30Ω, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω	-	6	11	ns
t _r	Turn-on Rise Time		-	6	11	
t _{d(OFF)}	Turn-off Delay Time		-	18	33	
t _f	Turn-off Fall Time		-	5	9	
Gate Charge Characteristics ^f						
Q _g	Total Gate Charge	V _{DS} =30V, V _{GS} =4.5V, I _{DS} =2.5A	-	4.8	-	nC
Q _g	Total Gate Charge	V _{DS} =30V, V _{GS} =10V, I _{DS} =2.5A	-	10	14	
Q _{gs}	Gate-Source Charge		-	2	-	
Q _{gd}	Gate-Drain Charge		-	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.

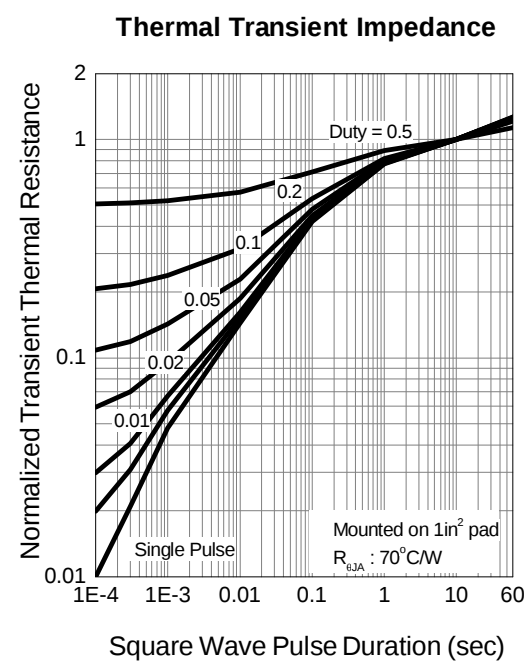
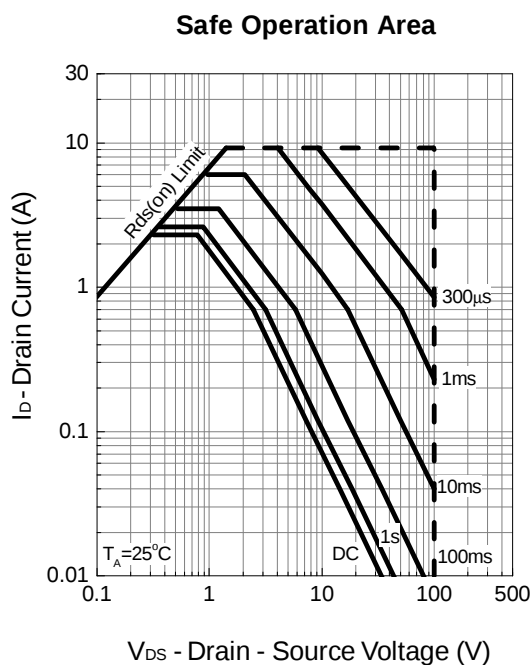
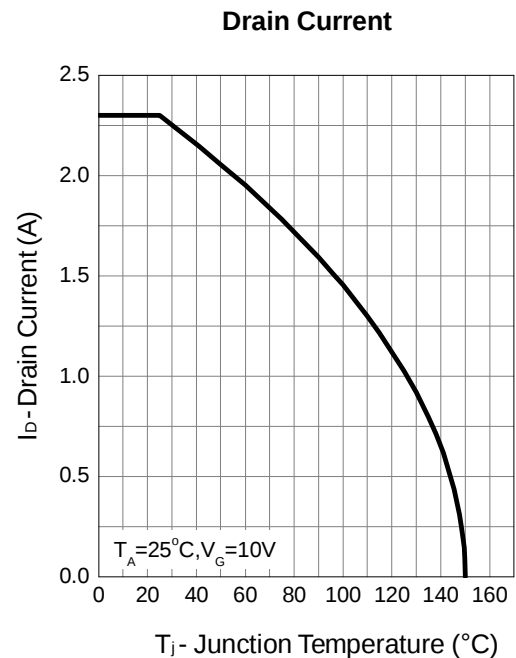
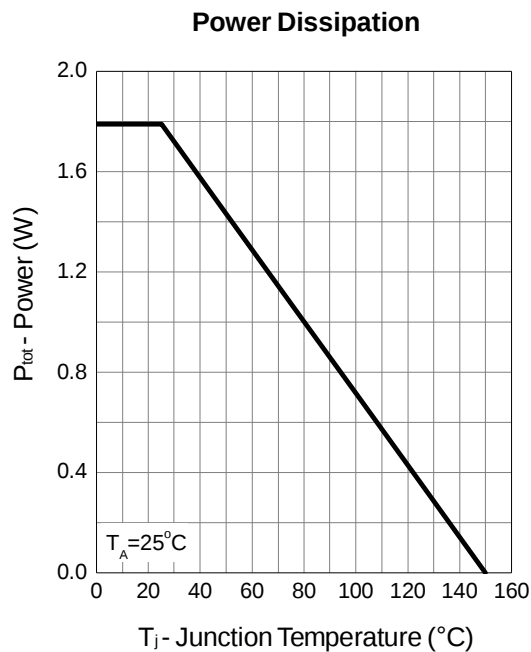
P Channel Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	P Channel			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =-250μA	-100	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-80V, 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	-3	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±10	μA
R _{DS(ON)} ^e	Drain-Source On-state Resistance	V _{GS} =-10V, I _{DS} =-1.6A	-	280	350	mΩ
		V _{GS} =-4.5V, I _{DS} =-1A	-	299	405	mΩ
		V _{GS} =-4.0V, I _{DS} =-1A	-	307	450	mΩ
Diode Characteristics						
V _{SD} ^e	Diode Forward Voltage	I _{SD} =-1A, V _{GS} =0V	-	-0.75	-1	V
t _{rr}	Reverse Recovery Time	I _{SD} =-1.6A, dI _{SD} /dt=100A/μs	-	23	-	ns
Q _{rr}	Reverse Recovery Charge		-	25	-	nC
Dynamic Characteristics ^f						
R _G	Gate Resistance	V _{GS} =0V,V _{DS} =0V,f=1MHz	-	12	24	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-30V, Frequency=1.0MHz	-	440	572	pF
C _{oss}	Output Capacitance		-	30	-	
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		-	4	7	
t _{d(OFF)}	Turn-off Delay Time		-	32	58	
t _f	Turn-off Fall Time		-	23	41	
Gate Charge Characteristics ^f						
Q _g	Total Gate Charge	V _{DS} =-30V, V _{GS} =-4.5V, I _{DS} =-1.6A	-	5.2	-	nC
Q _g	Total Gate Charge	V _{DS} =-30V, V _{GS} =-10V, I _{DS} =-1.6A	-	10.8	15	
Q _{gs}	Gate-Source Charge		-	1.5	-	
Q _{gd}	Gate-Drain Charge		-	2	-	

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

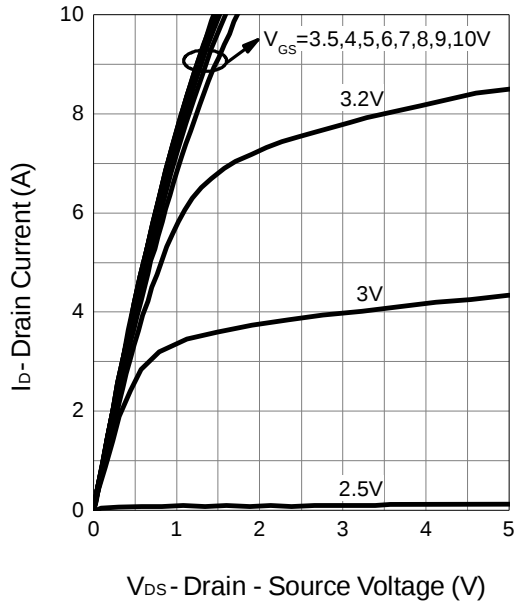
Note f : Guaranteed by design, not subject to production testing.

N Channel Typical Operating Characteristics

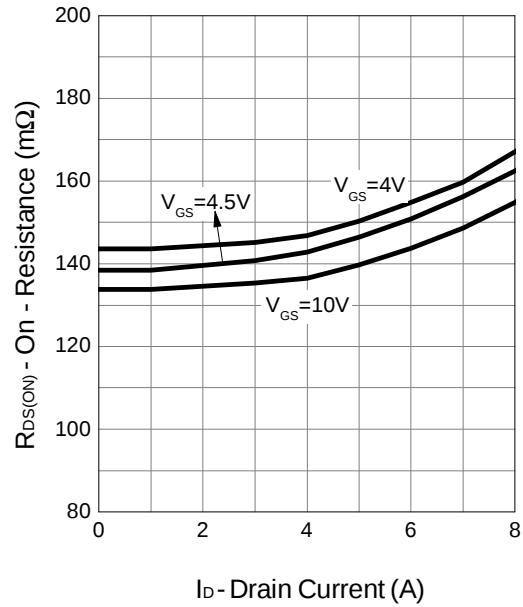


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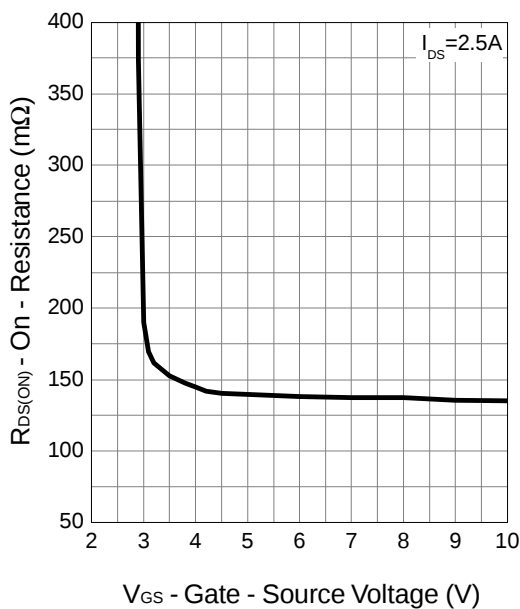
Output Characteristics



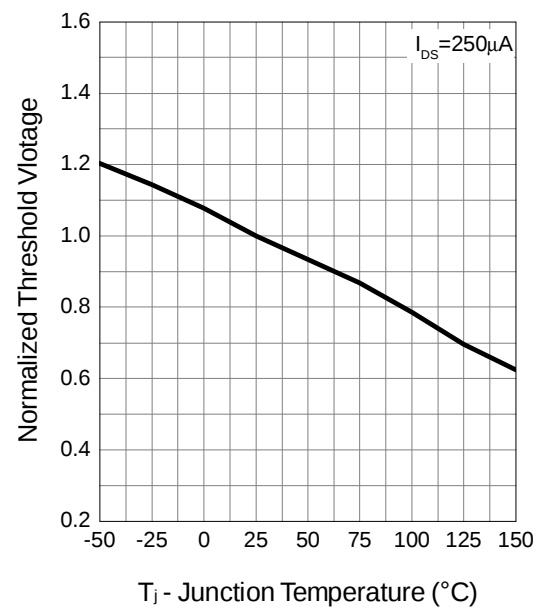
Drain-Source On Resistance



Gate-Source On Resistance

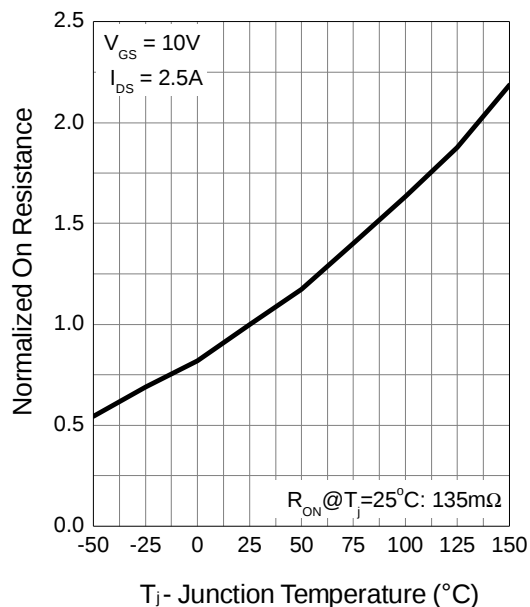


Gate Threshold Voltage

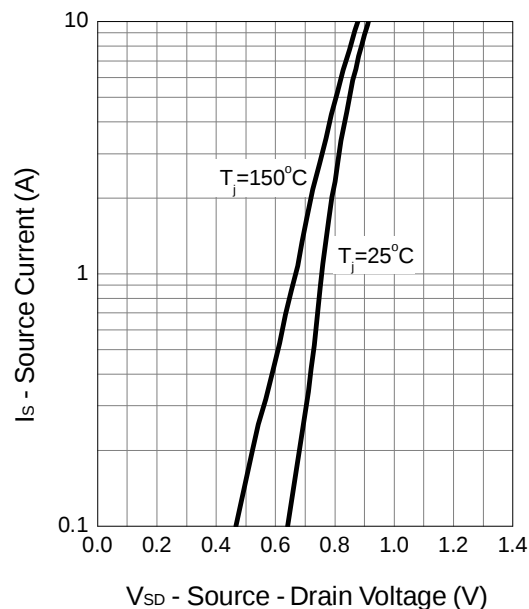


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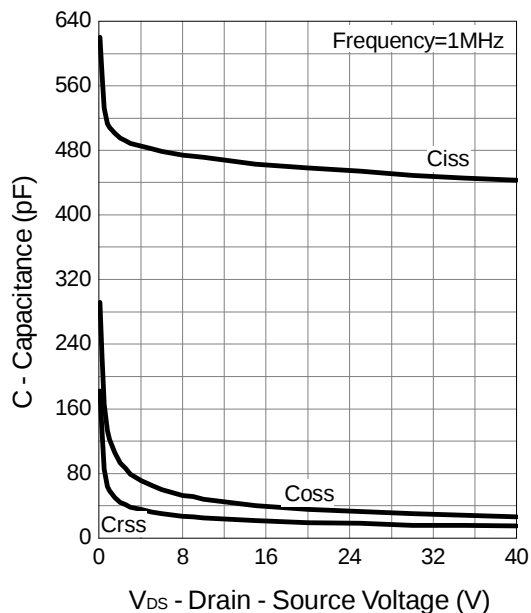
Drain-Source On Resistance



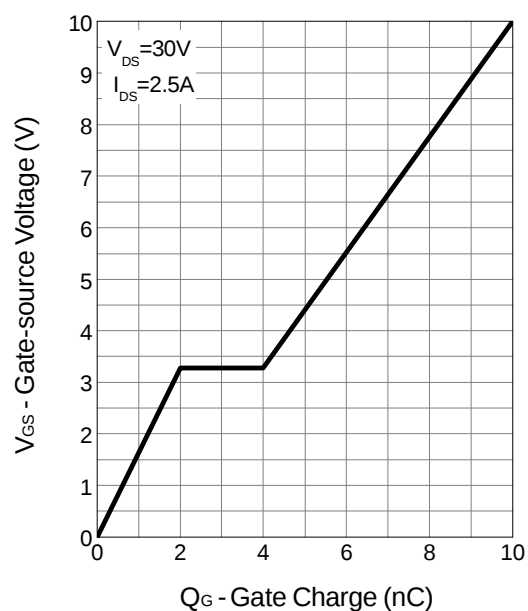
Source-Drain Diode Forward



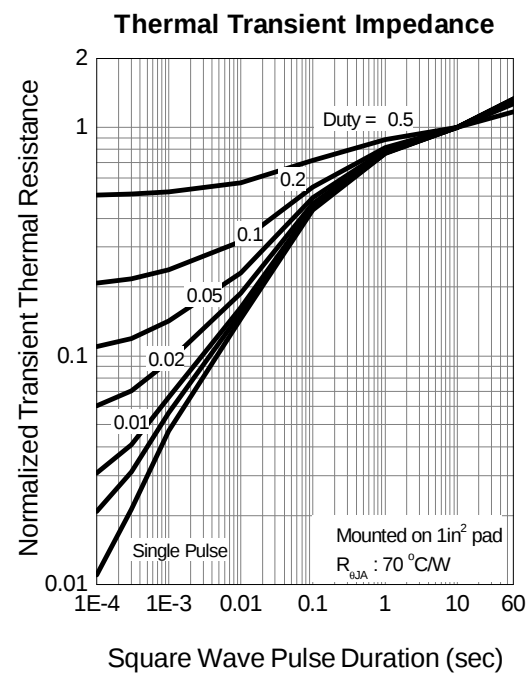
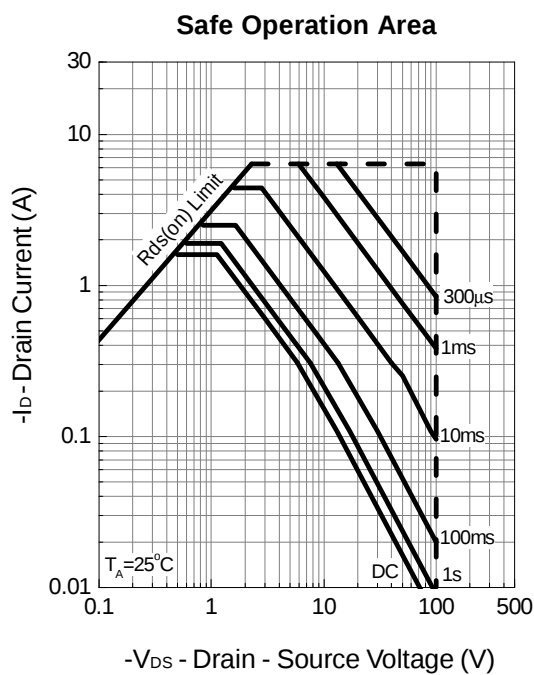
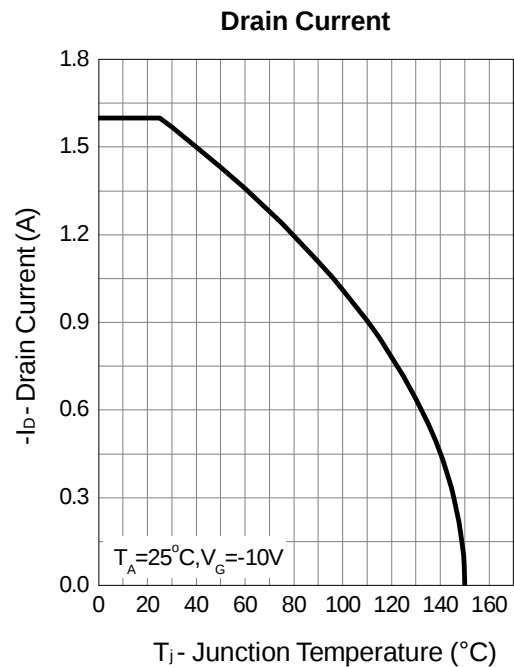
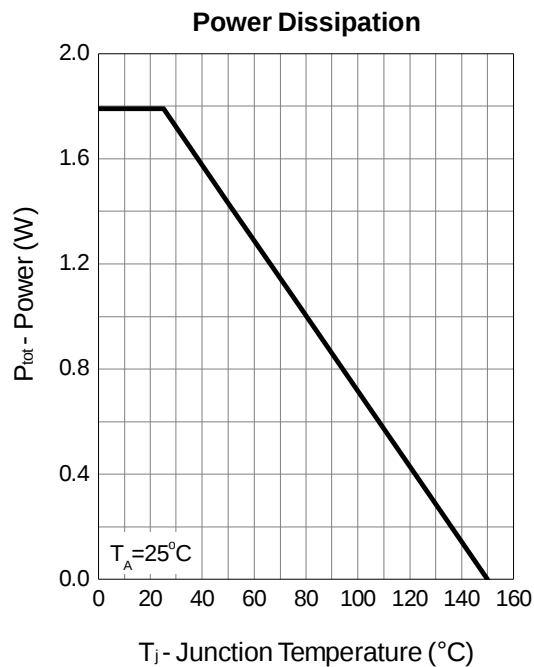
Capacitance



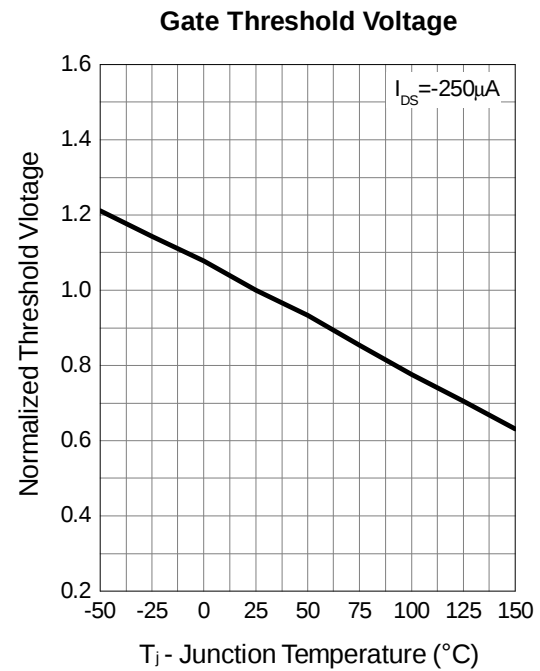
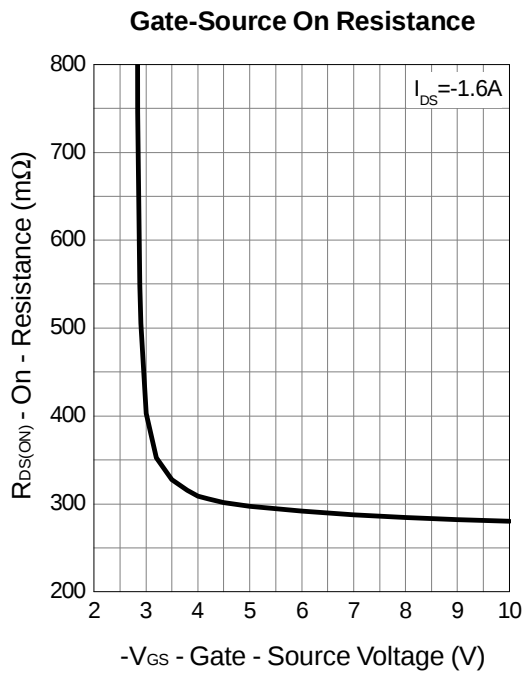
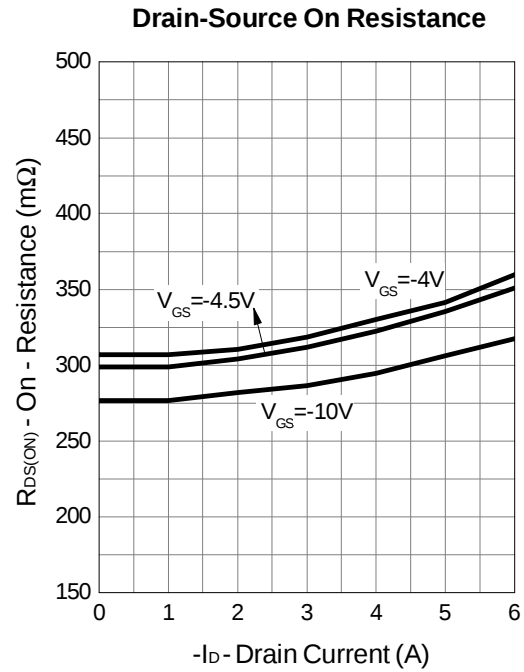
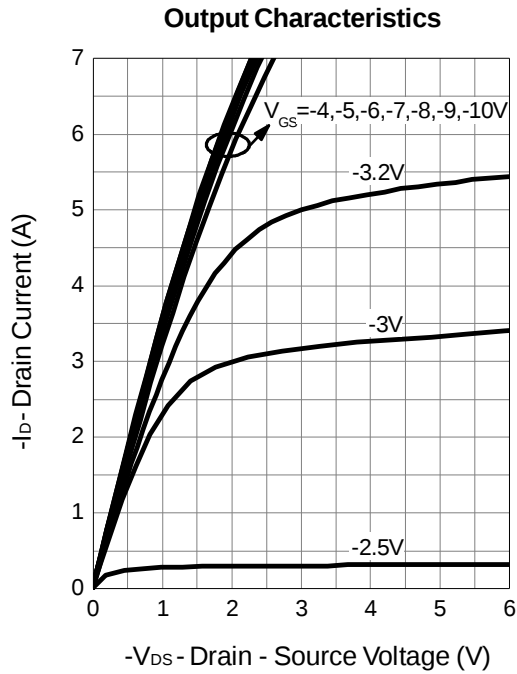
Gate Charge



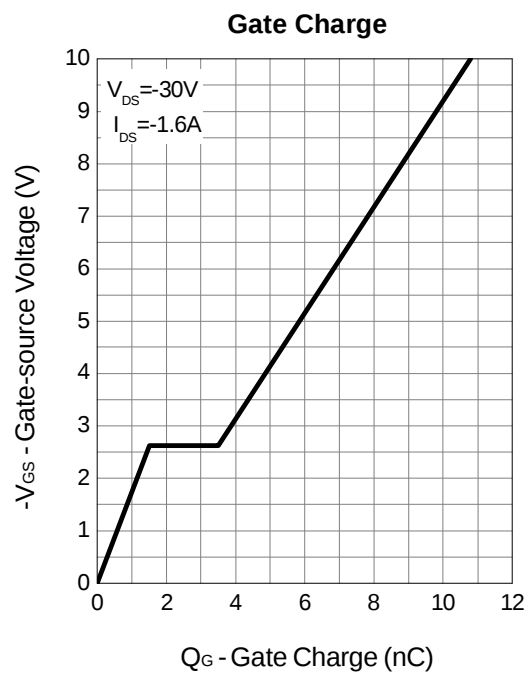
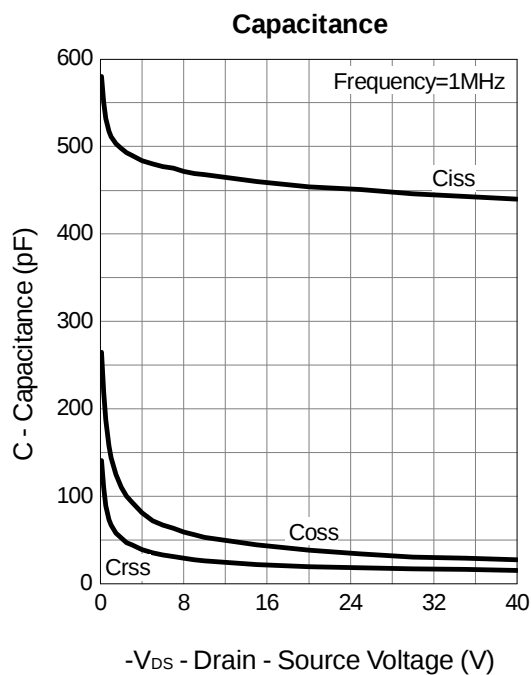
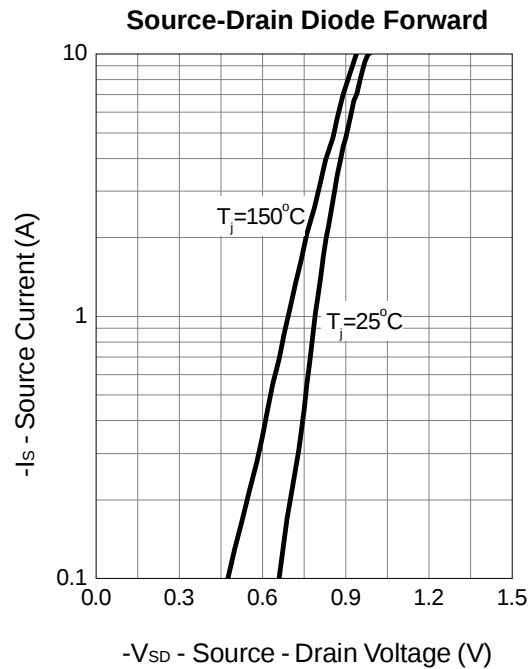
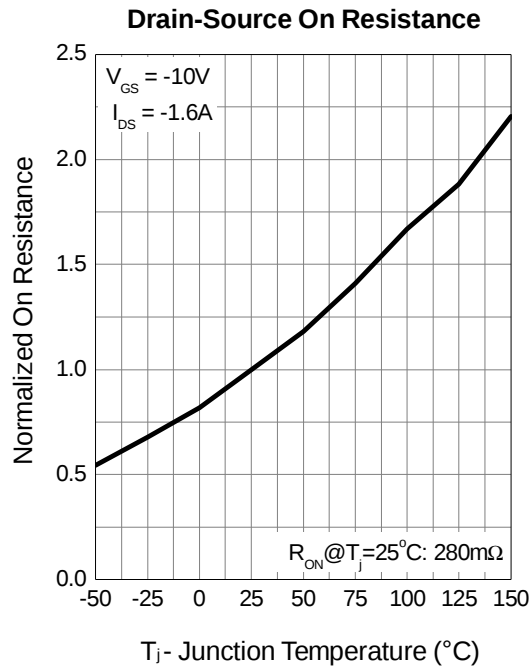
P Channel Typical Operating Characteristics



P Channel Typical Operating Characteristics (Cont.)

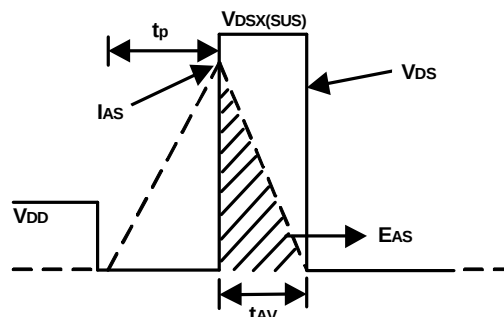
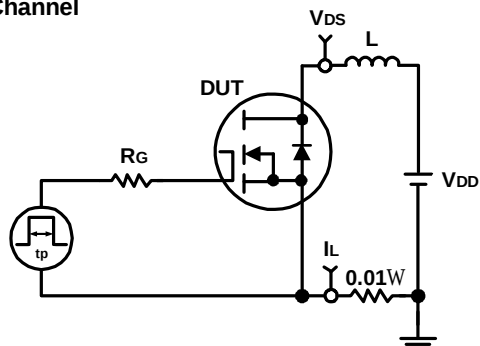


P Channel Typical Operating Characteristics (Cont.)

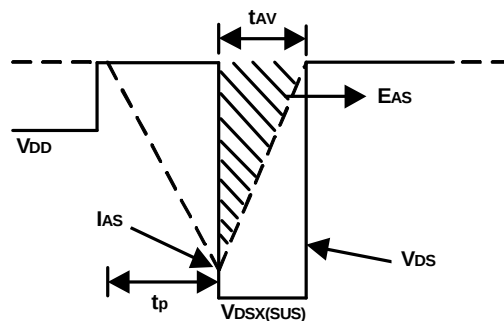
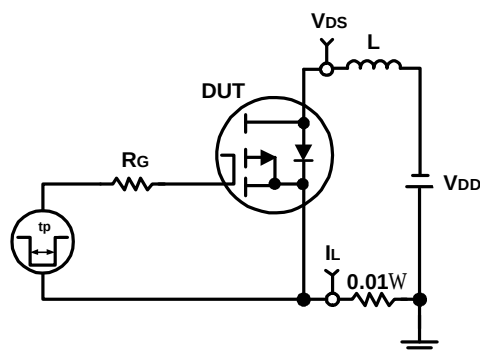


Avalanche Test Circuit and Waveforms

N Channel

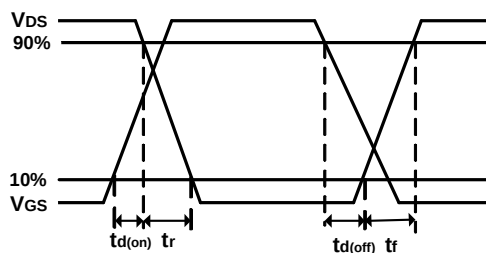
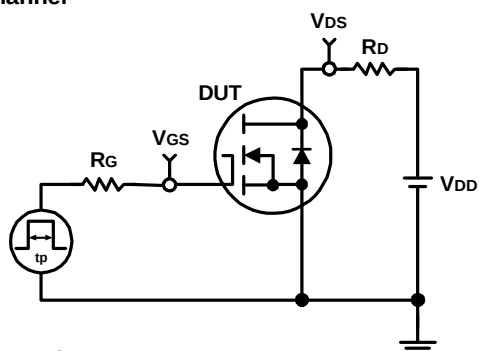


P Channel

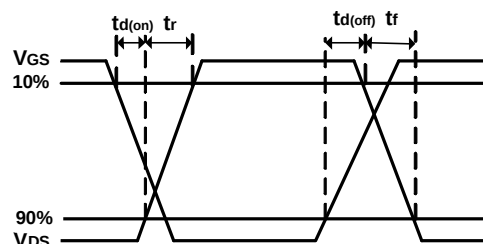
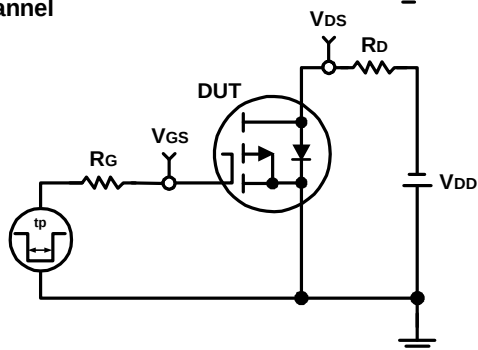


Switching Time Test Circuit and Waveforms

N Channel

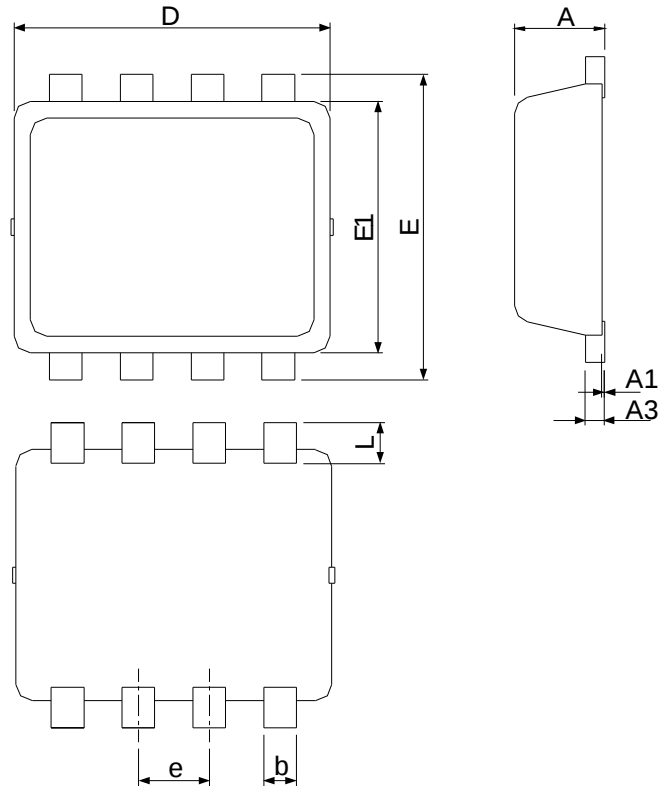


P Channel



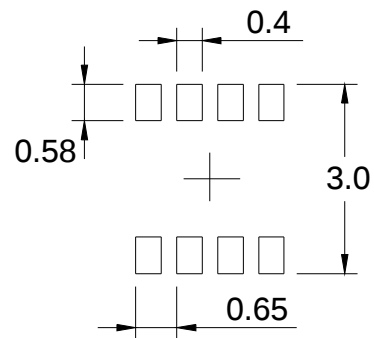
Package Information

DUAL DFN3x3-8(NP)



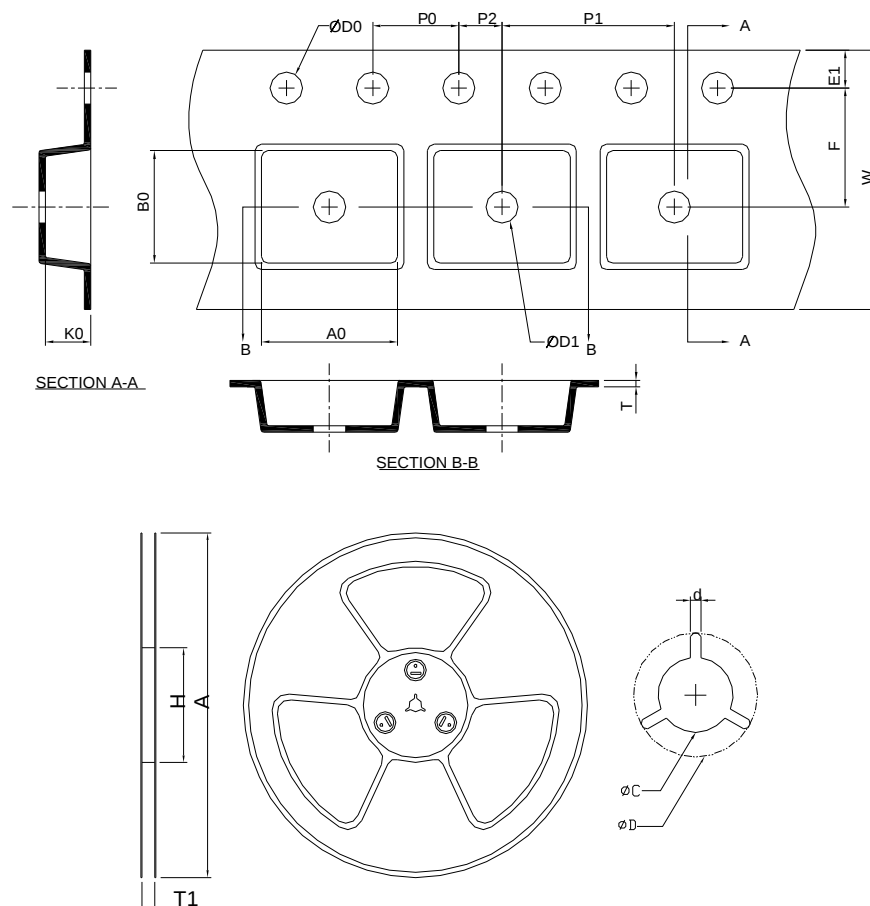
SYMBOL	DUAL DFN3x3-8(NP)			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.80	1.00	0.032	0.039
A1	0.00	0.05	0.000	0.002
A3	0.08	0.25	0.003	0.010
b	0.24	0.35	0.009	0.014
D	2.80	3.00	0.110	0.118
E	2.60	3.00	0.102	0.118
E1	2.20	2.40	0.087	0.095
e	0.65 BSC		0.026 BSC	
L	0.20	0.45	0.008	0.018

RECOMMENDED LAND PATTERN



UNIT: mm

Carrier Tape & Reel Dimensions

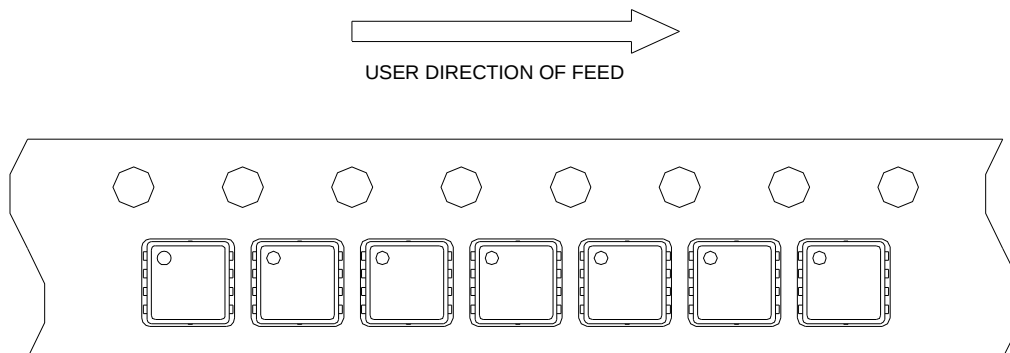


Application	A	H	T1	C	d	D	W	E1	F
DUAL DFN3x3-8 (NP)	330.0±2.00	50 MIN.	12.4+2.00 -0.00	13.0+0.50 -0.20	1.5 MIN.	20.2 MIN.	12.0±0.30	1.75±0.10	5.5±0.05
	P0	P1	P2	D0	D1	T	A0	B0	K0
	4.0±0.10	8.0±0.10	2.0±0.05	1.5+0.10 -0.00	1.5 MIN.	0.6+0.00 -0.40	3.35±0.20	3.35±0.20	1.30±0.20

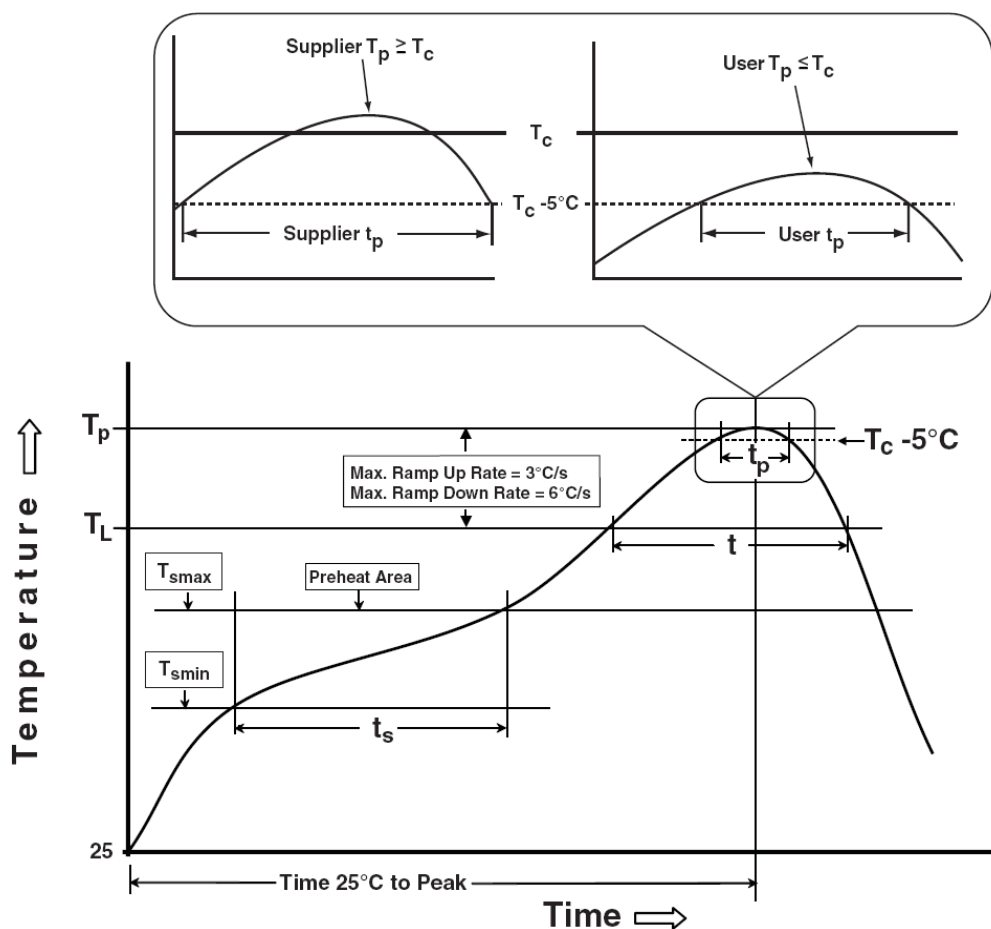
(mm)

Taping Direction Information

DUALDFN3x3-8(NP)



Classification Profile



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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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