Features

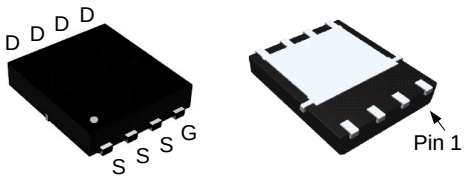
V_{DSS}	$R_{DS(ON)}$ @4.5V (Max)	$R_{DS(ON)}$ @10V (Max)	I_D
30V	3.9mΩ	2.5mΩ	80A

- Reliable and Rugged
- Lower Q_g and Q_{gd} for high-speed switching
- Lower $R_{DS(ON)}$ to Minimize Conduction Losses
- Lead Free and Green Devices Available (RoHS Compliant)

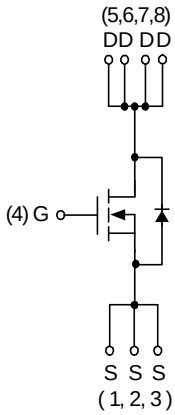
Applications

- Power Management in Desktop Computer or DC/DC Converters.
- Power Load Switch.
- Notebook Battery Management.

Pin Description



DFN5x6-8



N-Channel MOSFET

Absolute Maximum Ratings (T_A = 25°C Unless Otherwise Noted)

Symbol	Parameter	Rating	Unit
Common Ratings			
V_{DSS}	Drain-Source Voltage	30	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_C=25°C	23	A
I_D [a]	Continuous Drain Current	T_C=25°C	80*	A
		T_C=100°C	60	A
I_{DM} [b]	Pulsed Drain Current	T_C=25°C	160	A
P_D	Maximum Power Dissipation	T_C=25°C	50	W
		T_C=100°C	20	W
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	2.5	°C/W
I_D [c]	Continuous Drain Current	T_A=25°C	23.5	A
		T_A=70°C	18.8	A
P_D [c]	Maximum Power Dissipation	T_A=25°C	2.5	W
		T_A=70°C	1.6	W
$R_{\theta JA}$ [c]	Thermal Resistance-Junction to Ambient	t ≤ 10s	20	°C/W
		Steady State	50	°C/W
I_{AS} [d]	Avalanche Current, Single pulse	L=0.1mH	30	A
E_{AS} [d]	Avalanche Energy, Single pulse	L=0.1mH	45	mJ

Note a,*：Max. continue current is limited by bonding wire.
Note b：Pulse width is limited by max. junction temperature.
Note c：$R_{\theta JA}$ steady state t=100s.
Note d：UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature T_j=25°C).

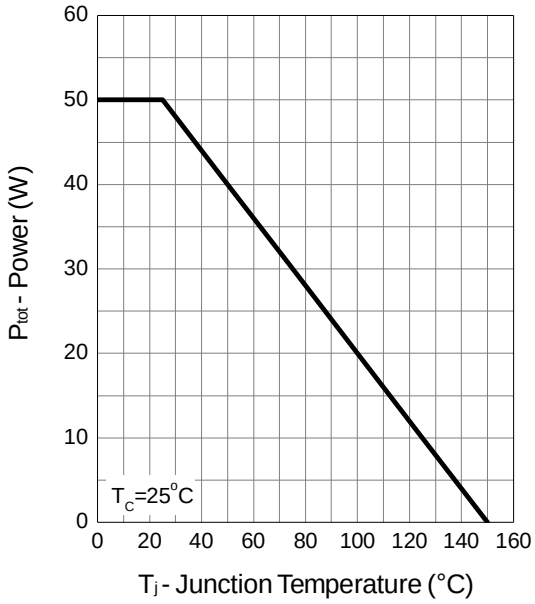
Electrical Characteristics (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=250μA	30	-	-	V
BV_{DSSt}	Drain-Source Breakdown Voltage (transient)	VGS=0V, $I_{D(aval)}$=30A T_{case}=25°C, $t_{transient}$=100ns	34	-	-	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	1.5	1.7	2.5	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	-	2.5	3	mΩ
		T_J=125°C	-	3.75	-	
		V_{GS}=4.5V, I_{DS}=15A	-	3.9	5.1	
Gfs	Forward Transconductance	V_{DS}=5V, I_{DS}=10A	-	27	-	S
Diode Characteristics						
V_{SD} [e]	Diode Forward Voltage	I_{SD}=20A, V_{GS}=0V	-	0.81	1.1	V
t_{rr}	Reverse Recovery Time	I_{SD}=20A, dI_{SD}/dt=100A/μs	-	21	-	ns
t_a	Charge Time		-	13	-	
t_b	Discharge Time		-	8	-	
Q_{rr}	Reverse Recovery Charge		-	6.3	-	nC
Dynamic Characteristics						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz	0.7	1	2	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=15V, Frequency=1.0MHz	-	1350	-	pF
C_{oss}	Output Capacitance		-	900	-	
C_{rss}	Reverse Transfer Capacitance		-	65	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=12V, R_L=2.1Ω, I_{DS}=5.7A, V_{GEN}=10V, R_G=2.9Ω	-	14.3	-	ns
t_r	Turn-on Rise Time		-	26	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	24	-	
t_f	Turn-off Fall Time		-	4.4	-	
Gate Charge Characteristics						
Q_g	Total Gate Charge	V_{DS}=15V, V_{GS}=10V, I_{DS}=20A	-	20	30	nC
Q_g	Total Gate Charge	V_{DS}=15V, V_{GS}=4.5V, I_{DS}=20A	-	9.2	-	
Q_{gth}	Threshold Gate Charge		-	2.7	-	
Q_{gs}	Gate-Source Charge		-	6	-	
Q_{gd}	Gate-Drain Charge		-	2	-	

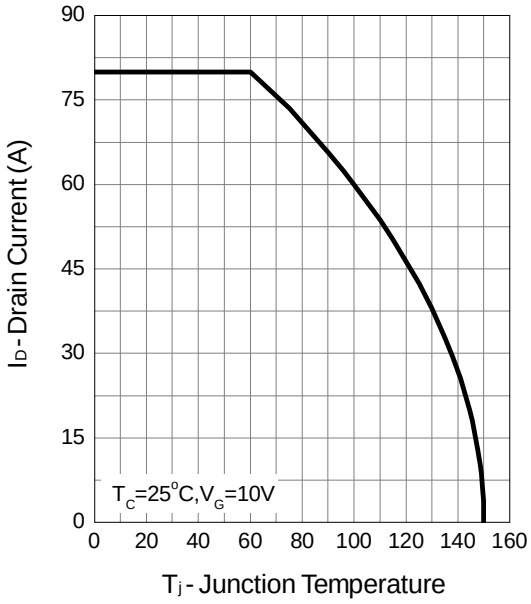
Note e：Pulse test ; pulse width≤300μs, duty cycle≤2%.

Typical Operating Characteristics

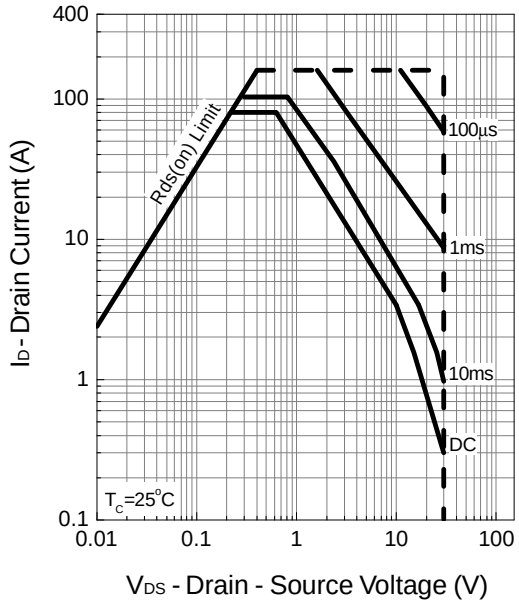
Power Dissipation



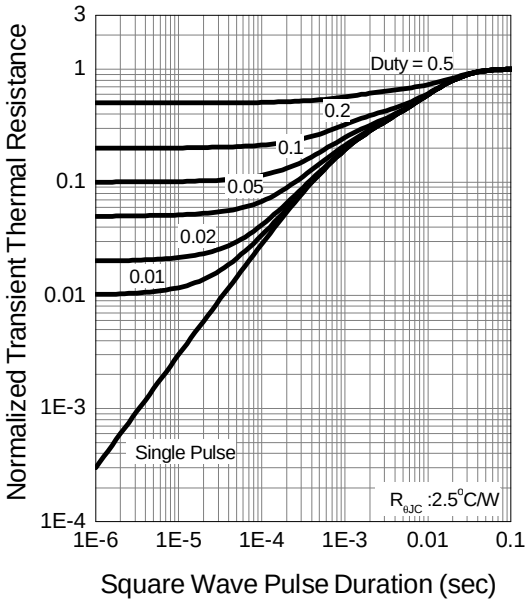
Drain Current



Safe Operation Area

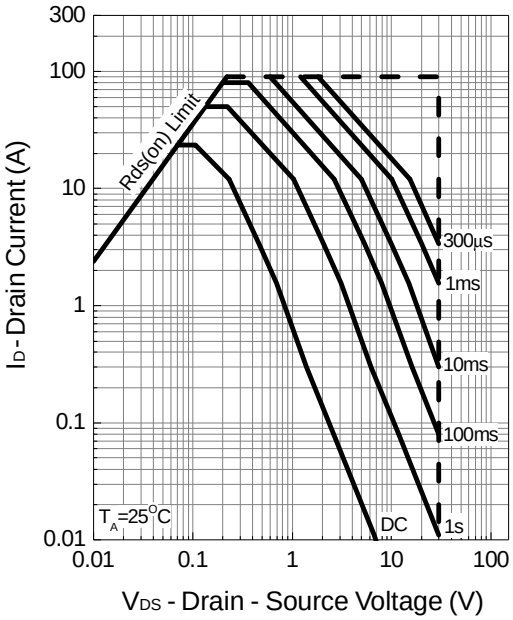


Thermal Transient Impedance

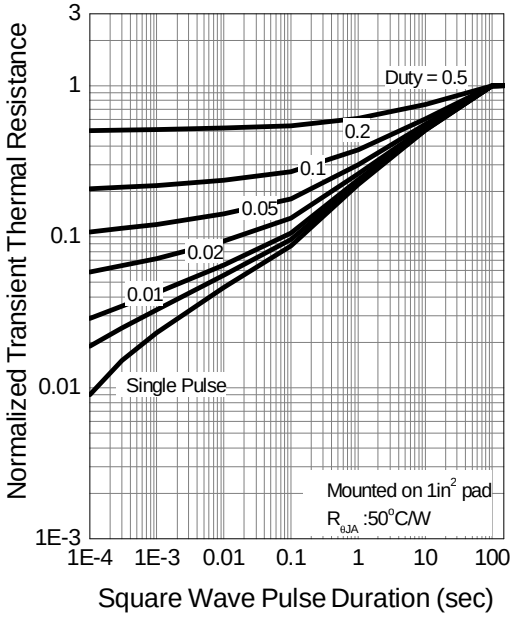


Typical Operating Characteristics (Cont.)

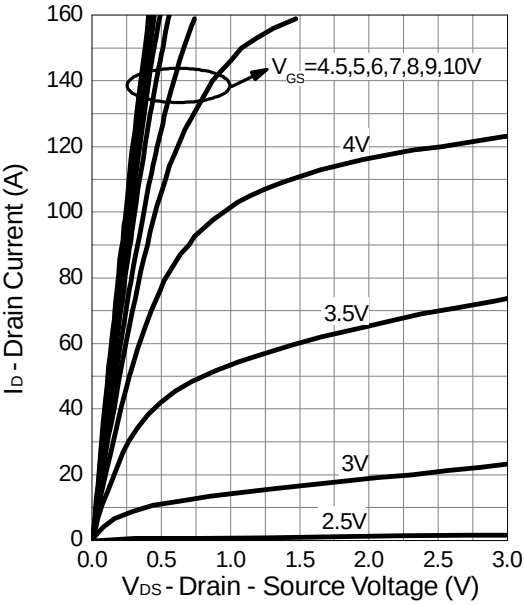
Safe Operation Area



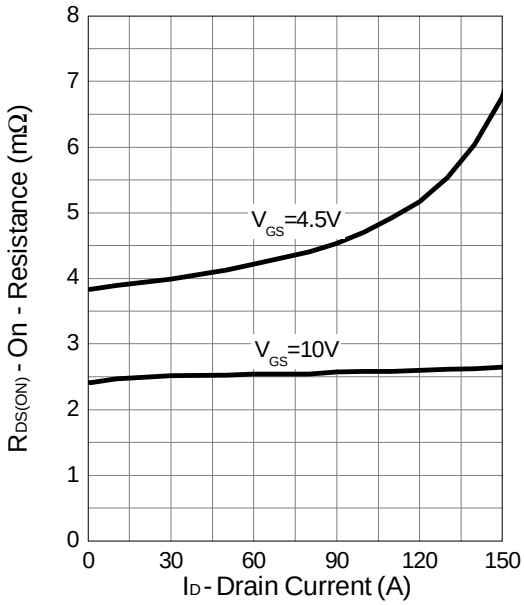
Thermal Transient Impedance



Output Characteristics

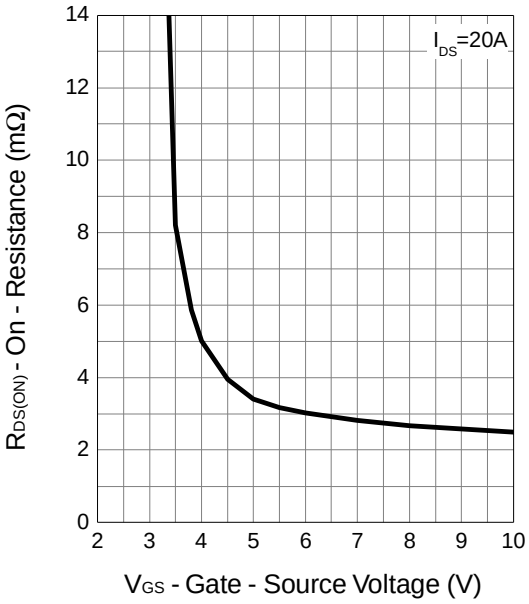


Drain-Source On Resistance

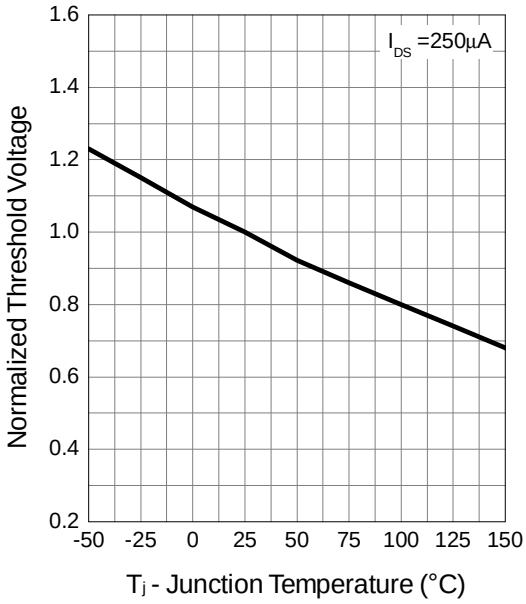


Typical Operating Characteristics (Cont.)

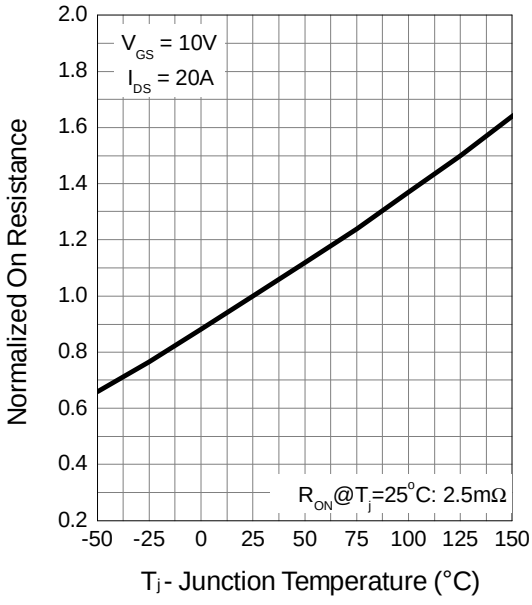
Gate-Source On Resistance



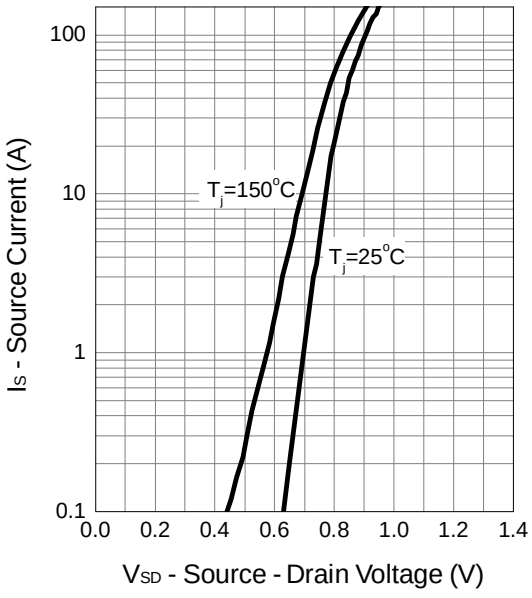
Gate Threshold Voltage



Drain-Source On Resistance

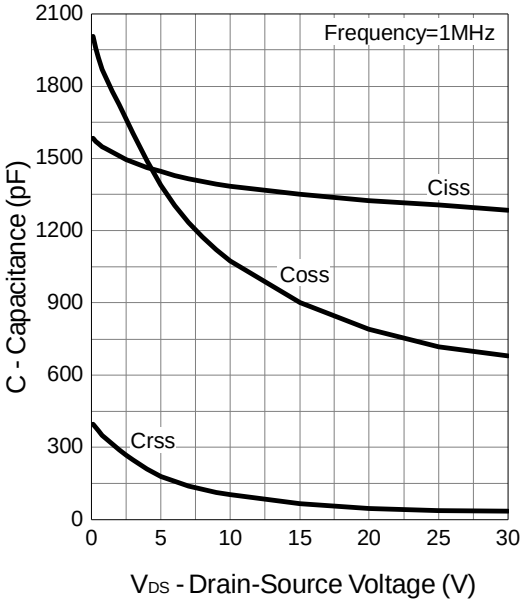


Source-Drain Diode Forward

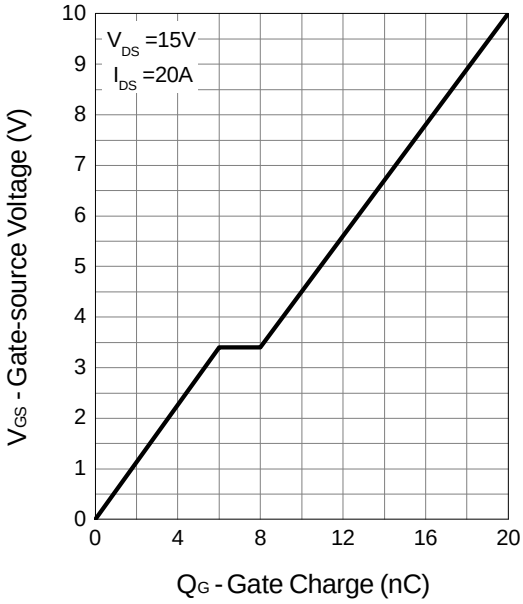


Typical Operating Characteristics (Cont.)

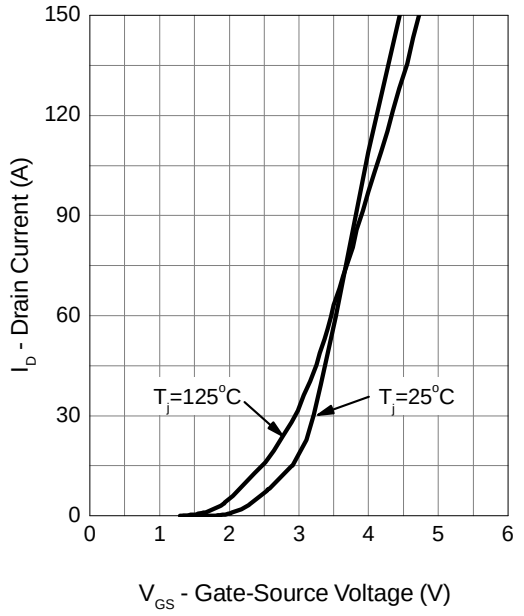
Capacitance



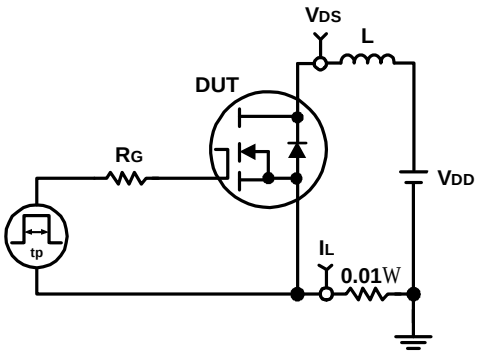
Gate Charge

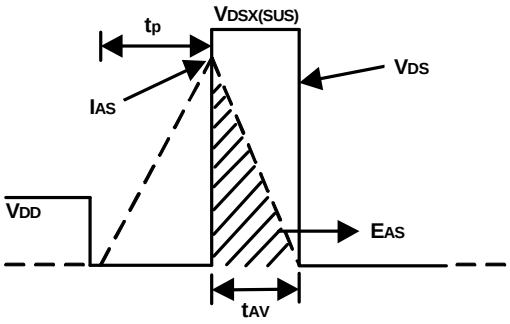


Transfer Characteristics

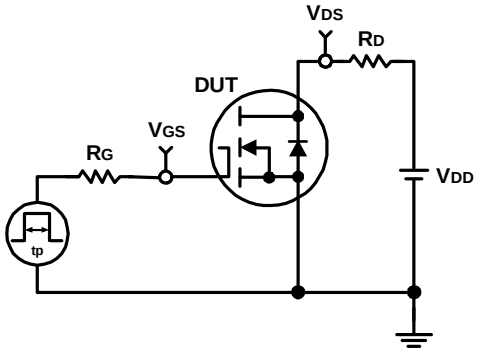


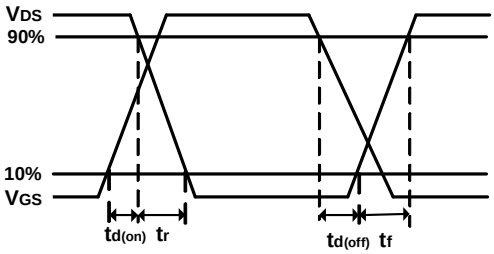
Avalanche Test Circuit and Waveforms





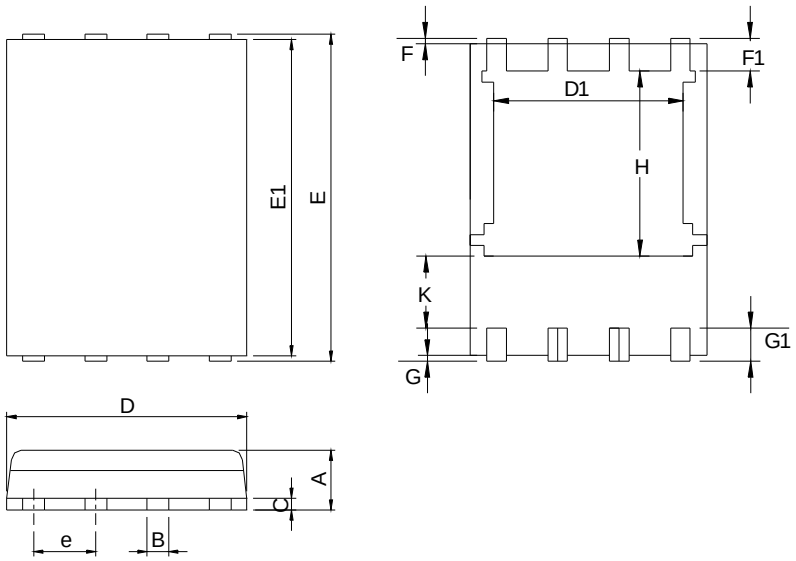
Switching Time Test Circuit and Waveforms





Package Information

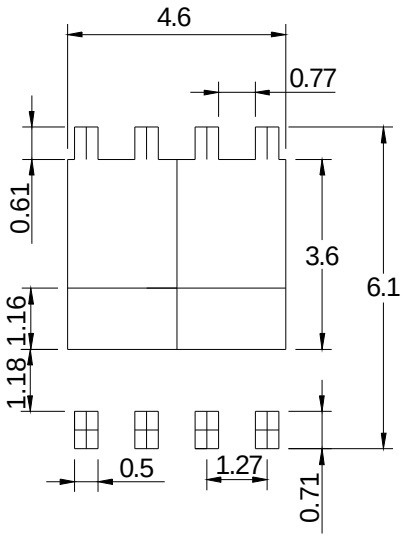
DFN5x6-8



SYMBOL	DFN5x6-8			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.90	1.20	0.035	0.047
B	0.3	0.51	0.012	0.020
C	0.19	0.25	0.007	0.010
D	4.80	5.30	0.189	0.209
D1	4.00	4.40	0.157	0.173
E	5.90	6.20	0.232	0.244
E1	5.50	5.80	0.217	0.228
e	1.27 BSC		0.050 BSC	
F	0.05	0.30	0.002	0.012
F1	0.35	0.75	0.014	0.030
G	0.05	0.30	0.002	0.012
G1	0.35	0.75	0.014	0.030
H	3.34	3.9	0.131	0.154
K	0.762	-	0.03	-

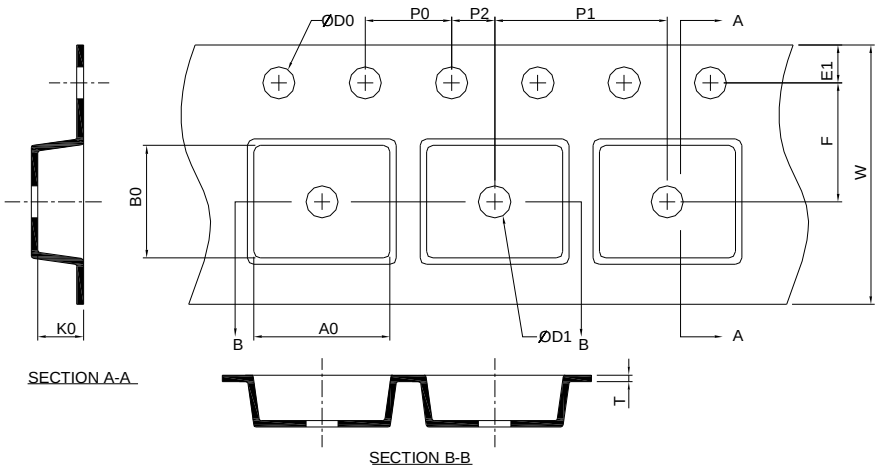
Note : 1.Dimension D, D1,D2 and E1 do not include mold flash or protrusions.
Mold flash or protrusions shall not exceed 10 mil.

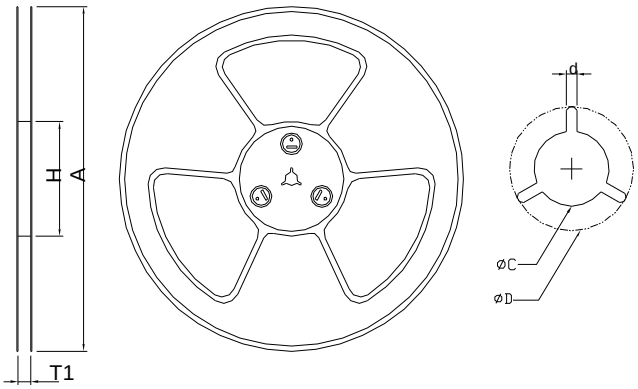
RECOMMENDED LAND PATTERN



UNIT: mm

Carrier Tape & Reel Dimensions



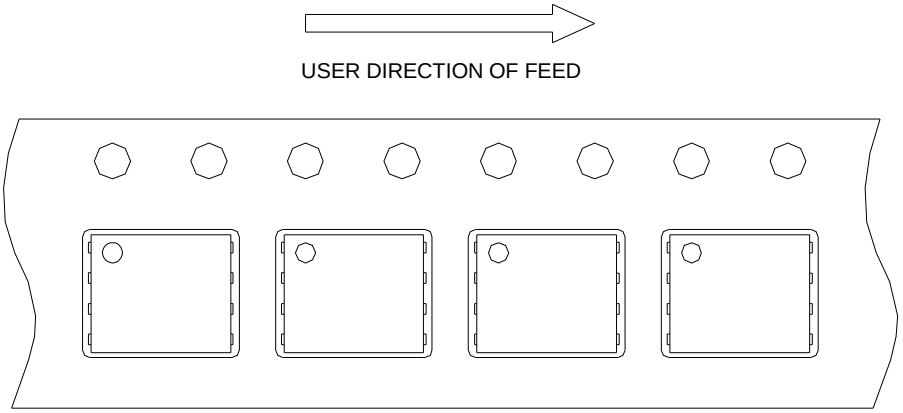


Application	A	H	T1	C	d	D	W	E1	F
DFN5x6-8	330.0±2.00	50 MIN.	12.4+2.00 -0.00	13.0+0.50 -0.20	1.5 MIN.	20.2 MIN.	12.0±0.30	1.75±0.10	5.5±0.10
	P0	**P1**	**P2**	**D0**	**D1**	**T**	**A0**	**B0**	**K0**
	4.0±0.10	8.0±0.10	2.0±0.10	1.5+0.10 -0.00	1.5 MIN.	0.3±0.05	6.5±0.10	5.3±0.10	1.4±0.10

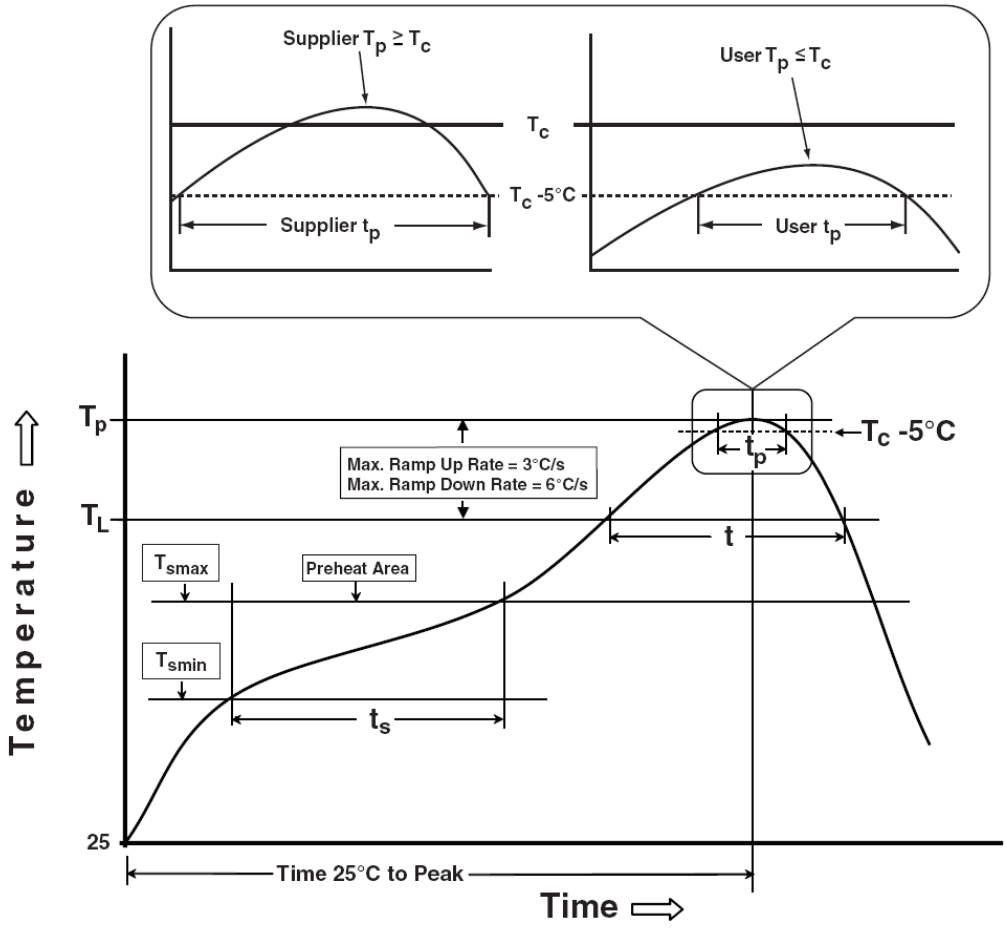
(mm)

Taping Direction Information

DFN5x6-8



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 (Tc)

Package Thickness	Volume mm^3 <350	Volume mm^3 ³350
<2.5 mm	235 ℃	220 °C
≥2.5 mm	220 ℃	220 °C

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

Package Thickness	Volume mm^3 <350	Volume mm^3 350-2000	Volume mm^3 >2000
<1.6 mm	260 ℃	260 °C	260 °C
1.6 mm – 2.5 mm	260 ℃	250 °C	245 °C
≥2.5 mm	250 ℃	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 @ Tjmax
HTGB	JESD-22, A108	1000 Hrs, 100% of VGS max @ Tjmax
PCT	JESD-22, A102	168 Hrs, 100%RH, 2atm, 121℃
TCT	JESD-22, A104	500 Cycles, -65°C~150℃