

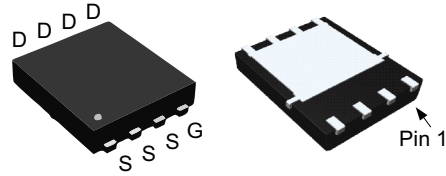
■ Features

- 100V/52A
 $R_{DS(ON)} = 17.5m\Omega$ (max.) @ $V_{GS} = 10V$
- Reliable and Rugged.
- Lead free and green device available (RoHS compliant).

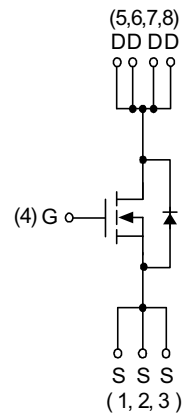
■ Application

- DC-DC converter.
- Motor control.

■ Pin Description



DFN5x6-8



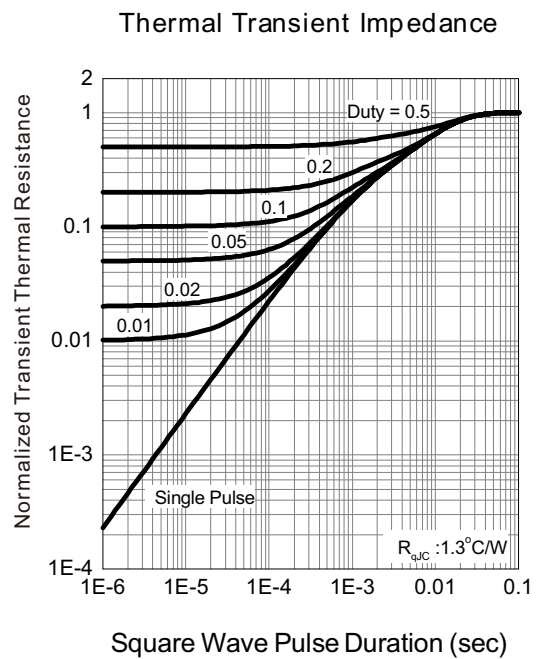
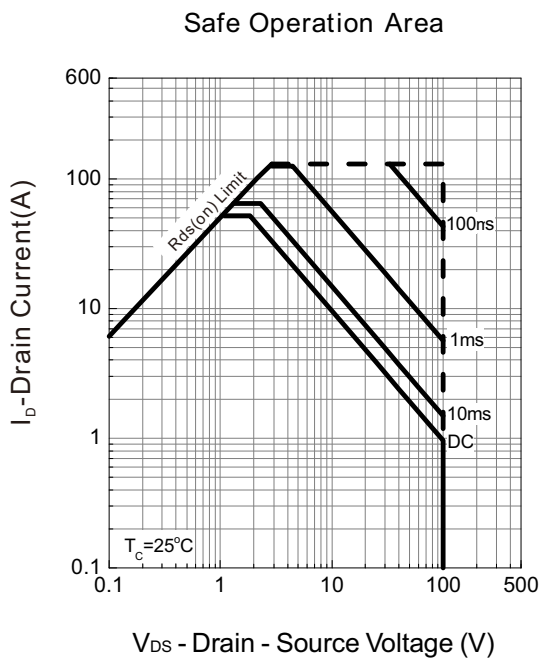
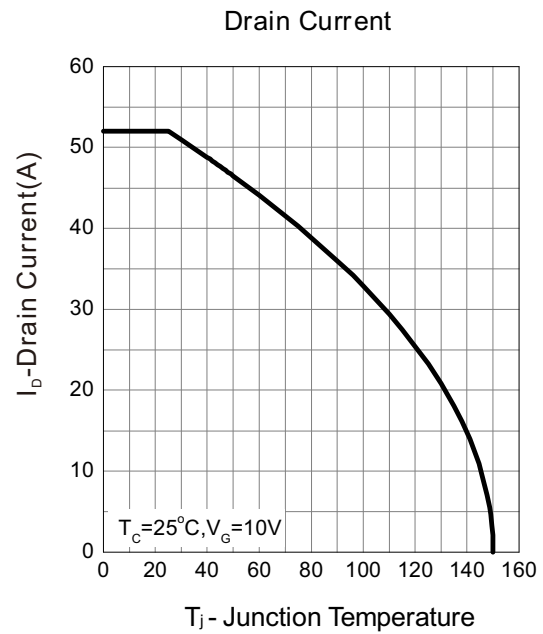
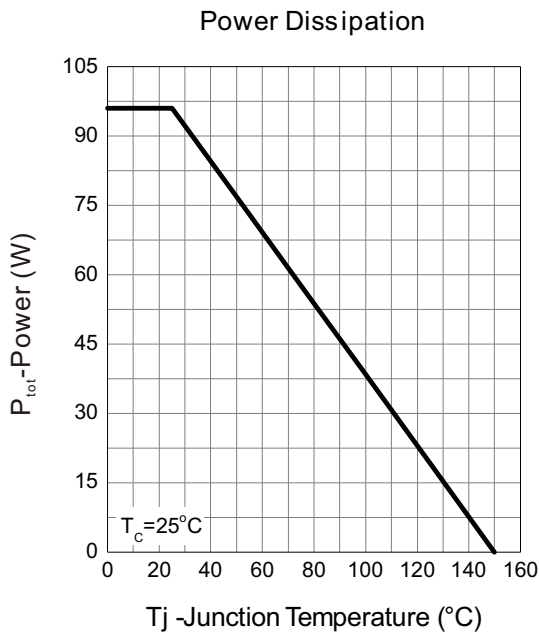
■ Absolute Maximum Ratings ($T_A = 25^\circ C$ unless otherwise specified)

PARAMETER	CONDITIONS	Symbol	MSQ175N10G	UNIT
Drain-Source Voltage		V_{DSS}	100	V
Continuous Drain Current	$T_c = 25^\circ C$	I_D	52	A
	$T_c = 100^\circ C$		33	
Pulsed Drain Current(Note:1)	$T_c = 25^\circ C$	I_{DM}	130	
Gate-Source Voltage		V_{GSS}	± 25	V
Diode Continuous Forward Current	$T_c = 25^\circ C$	I_S	26	A
Avalanche Current, single pulse (Note:2)	$L=0.5mH$	I_{AS}	26	A
Avalanche Energy, single pulse (Note:2)	$L=0.5mH$	E_{AS}	169	mJ
Maximum Power Dissipation	$T_c = 25^\circ C$	P_D	96	W
	$T_c = 100^\circ C$		38	
Thermal Resistance-Junction to Ambient(Note:3)	$t \leq 10s$	$R_{\theta JC}$	25	$^\circ C/W$
	Steady State		60	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 ~ +150	$^\circ C$
Maximum Power Dissipation	$T_A = 25^\circ C$	P_D	5	W
	$T_A = 70^\circ C$		3.2	
Continuous Drain Current	$T_A = 25^\circ C$	I_D	12	A
	$T_A = 70^\circ C$		9.6	
Thermal Resistance-Junction to case(Note:3)			1.3	$^\circ C/W$

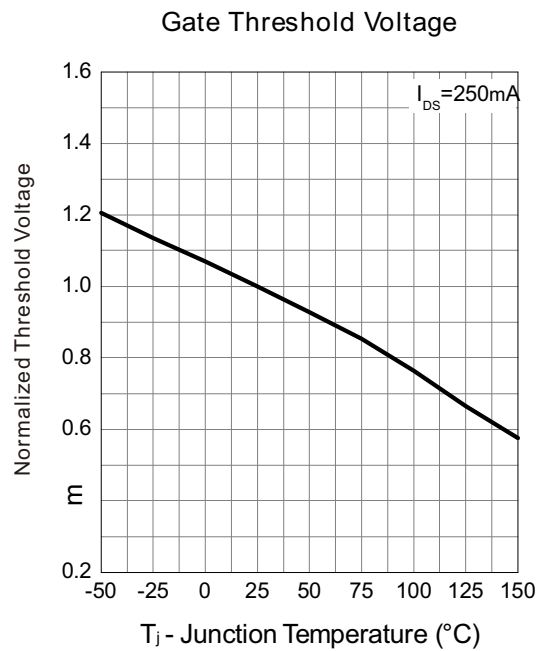
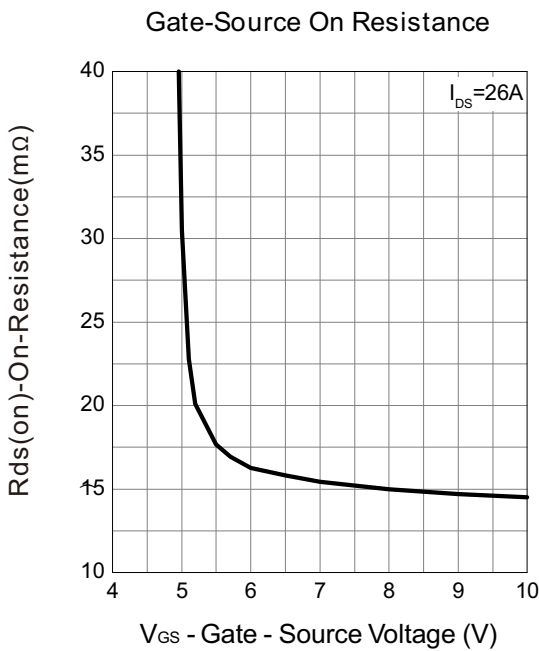
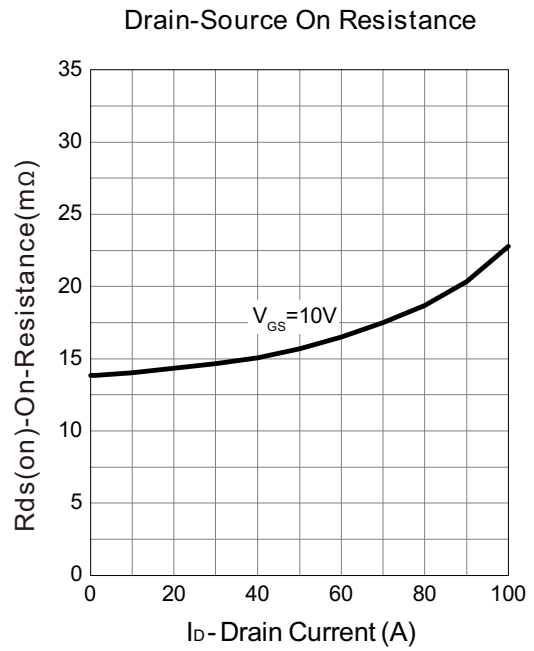
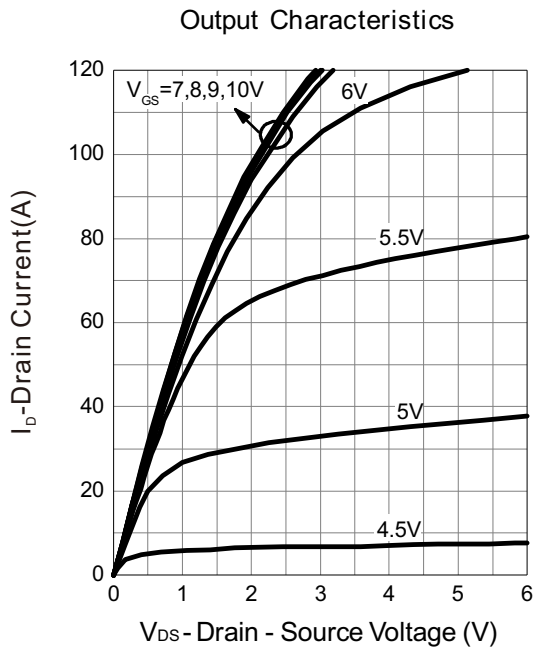
NOTE : 1.Repetitive rating; pulse width limited by maximum junction temperature.
 2.UIS tested and pulse width limited by maximum junction temperature 150 $^\circ C$ (initial temperature $T_J = 25^\circ C$).
 3.surface mounted on 1 inch per square pad area.

■ Electrical characteristics($T_A = 25^\circ\text{C}$ unless otherwise specified)						
PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_{DS} = 250\mu A$	V_{DSS}	100			V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{DS} = 250\mu A$	$V_{GS(th)}$	2	3	4	V
Zero Gate Voltage Drain Current	$V_{DS} = 80V, V_{GS} = 0V$	I_{DSS}			1	uA
	$V_{DS} = 80V, V_{GS} = 0V, T_j = 85^\circ\text{C}$				30	
Gate Leakage Current	$V_{GS} = \pm 25V, V_{DS} = 0V$	I_{GSS}			± 100	nA
Drain-Source On-state Resistance(Note:4)	$V_{GS} = 10V, I_{DS} = 26A$	$R_{DS(on)}$		14.5	17.5	m Ω
■ Diode Characteristics						
PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
Diode Forward Voltage(Note:4)	$I_{SD} = 13A, V_{GS} = 0V$	V_{SD}		0.8	1.3	V
Reverse Recovery Time	$I_{SD} = 13A, di_{SD}/dt = 100A/\mu s$	t_{RR}		44		ns
Reverse Recovery Charge		Q_{RR}		95		nC
■ Dynamic Characteristics(Note:5)						
PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
Gate Resistance	$V_{GS} = 0V, V_{DS} = 0V, f = 1.0\text{MHz}$	R_G		1		Ω
Input Capacitance	$V_{DS} = 30V, V_{GS} = 0V, f = 1.0\text{MHz}$	C_{iss}		2100	2730	pF
Output Capacitance		C_{oss}		255		
Reverse Transfer Capacitance		C_{rss}		100		
Turn on Delay Time	$V_{DD} = 30V, R_L = 30\Omega, I_{DS} = 1A, V_{GEN} = 10V, R_G = 6\Omega$	$t_{d(on)}$		19	35	ns
Turn on Rise Time		t_r		9	17	
Turn off Delay Time		$t_{d(off)}$		36	65	
Turn off Fall Time		t_f		22	40	
■ Gate-Charge Characteristics(Note:5)						
PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
Total Gate Charge	$V_{DS} = 50V, V_{GS} = 10V, I_{DS} = 26A$	Q_g		42	59	nC
Gate-Source Charge		Q_{gs}		12		
Gate-Drain Charge		Q_{gd}		12		
NOTE : 4.Pulse test; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$. 5.Guaranteed by design, not subject to production testing.						

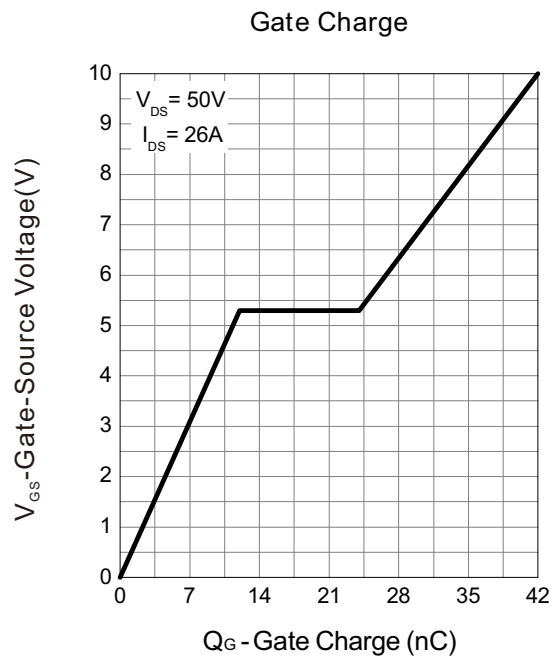
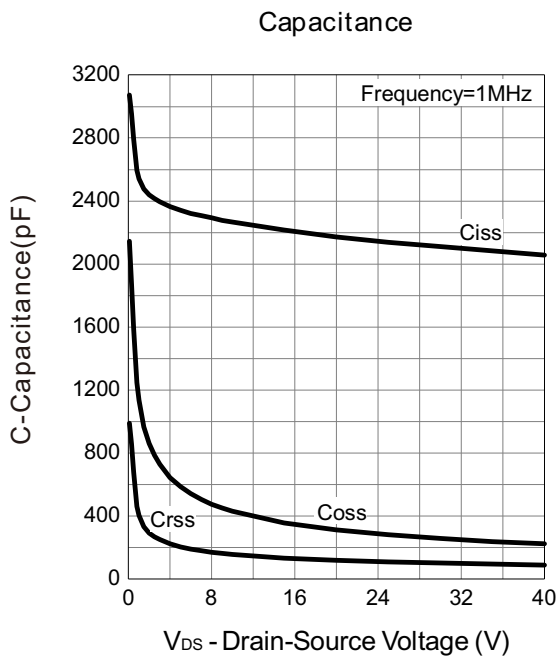
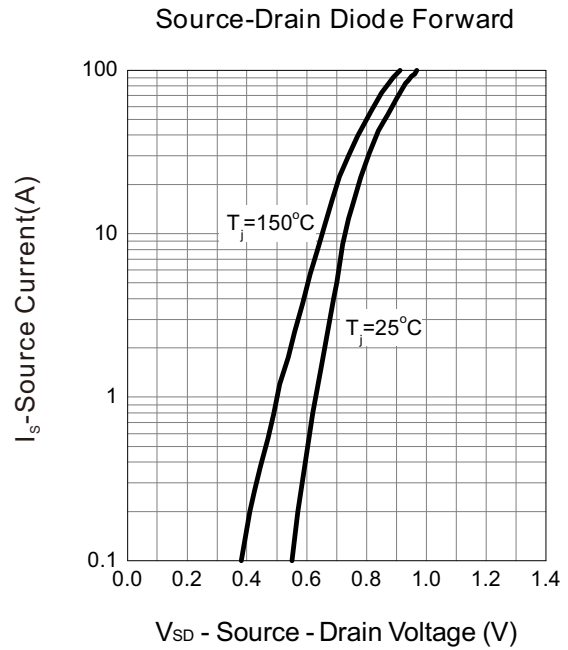
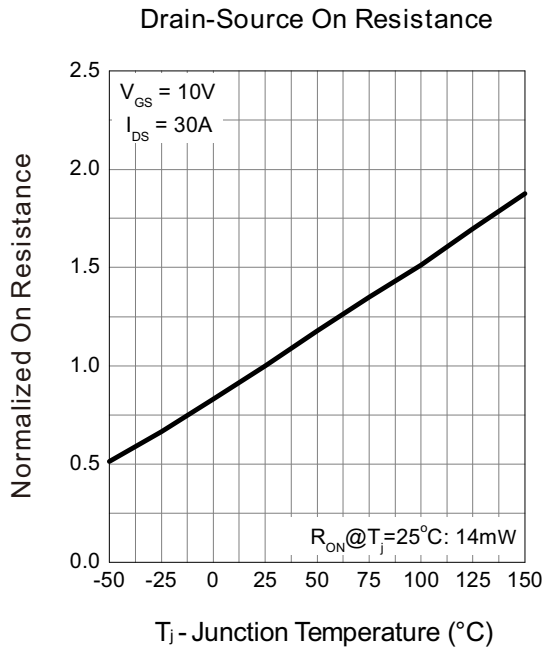
Rating and characteristic curves



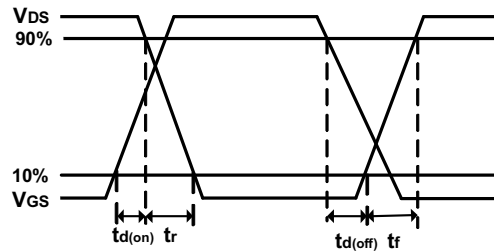
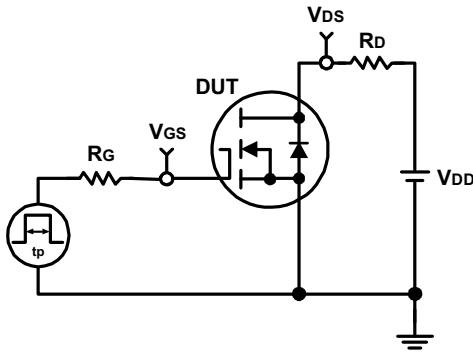
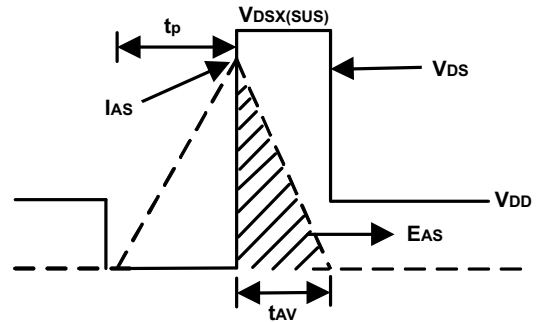
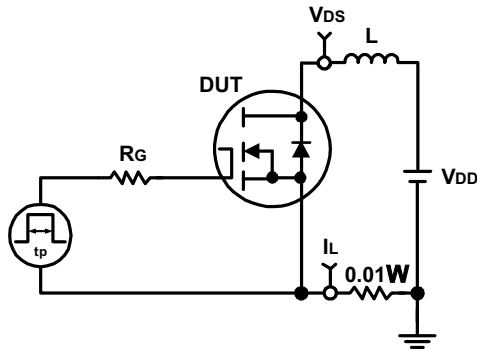
■ Rating and characteristic curves



Rating and characteristic curves

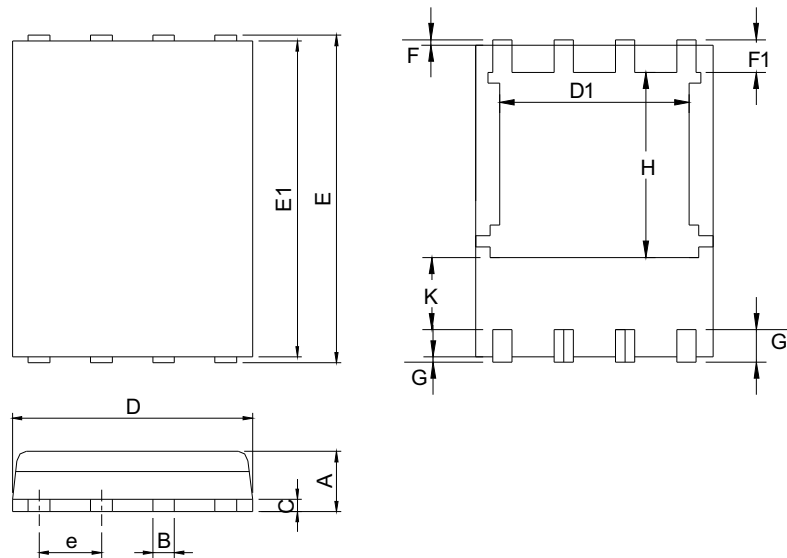


■ Test circuit and waveform



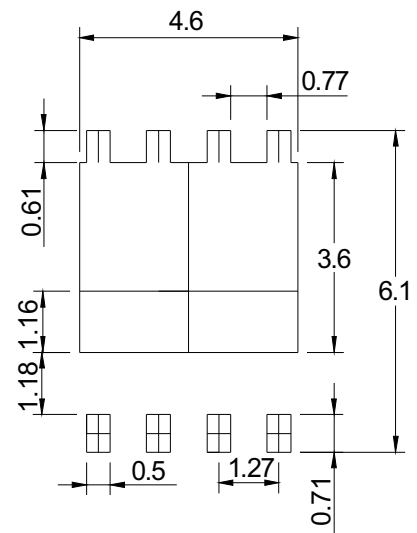
Package Information

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	-

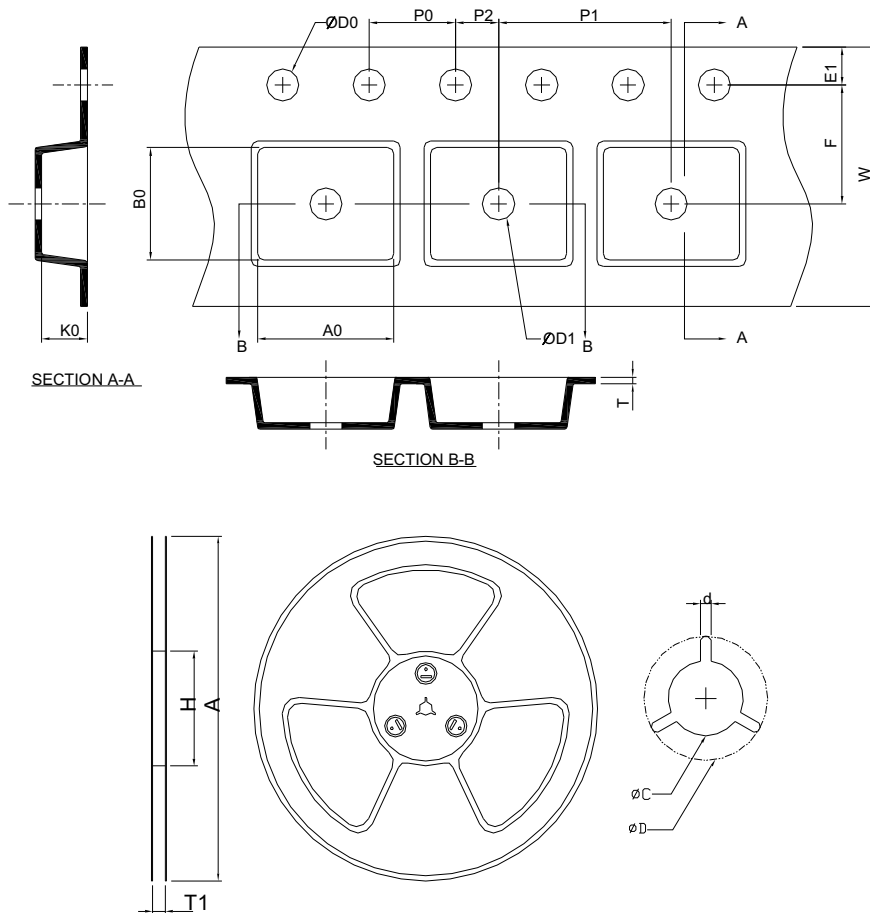
RECOMMENDED LAND PATTERN



UNIT: mm

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

Carrier Tape and Reel Dimension

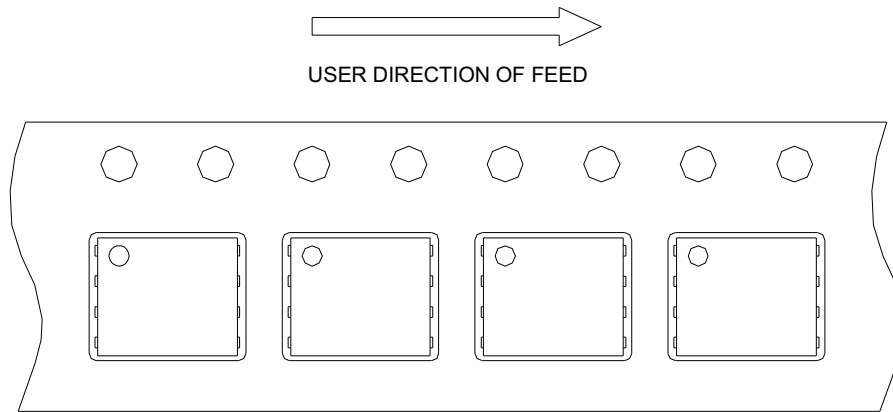


Application	A	H	T1	C	d	D	W	E1	F
DFN5x6-8	330.0±2.00	50 MIN.	12.4+2.00 -0.00	13.0+0.50 -0.20	1.5 MIN.	20.2 MIN.	12.0±0.30	1.75±0.10	5.5±0.10
	P0	P1	P2	D0	D1	T	A0	B0	K0
	4.0±0.10	8.0±0.10	2.0±0.10	1.5+0.10 -0.00	1.5 MIN.	0.3±0.05	6.5±0.10	5.3±0.10	1.4±0.10

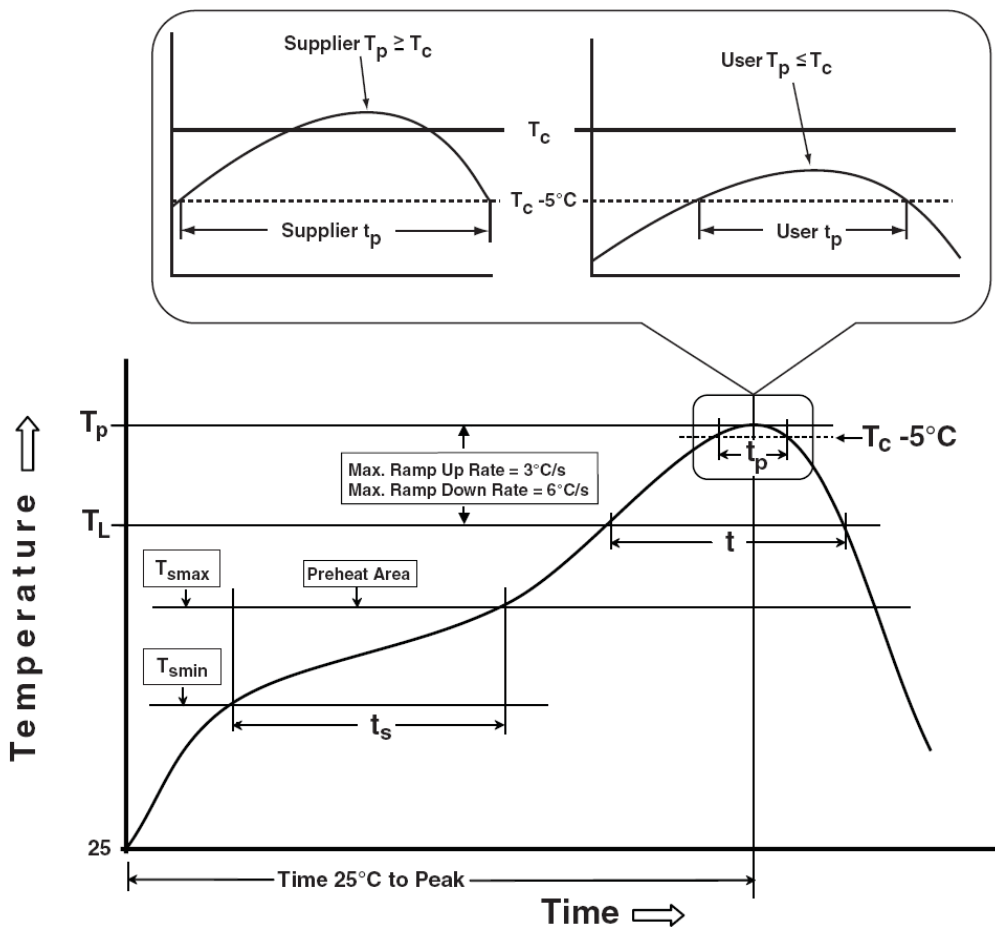
(mm)

■ Tapping Direction Information

DFN5x6-8



■ Classification Profile



■ Classification Reflow Profile

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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