P-Channel Enhancement Mode Power MOSFET

MTD9D0P03H8

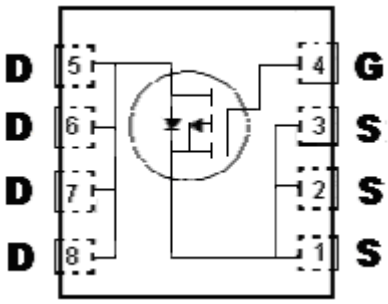
BV_{DSS}		-30V
I_D@V_{GS}=-10V, T_C=25°C		-55A
I_D@V_{GS}=-10V, T_A=25°C		-18.4A
$R_{DSON(TYP)}$	V_{GS}=-10V, I_D=-20A	8.1mΩ
	V_{GS}=-5V, I_D=-12A	18mΩ

Features

- Single Drive Requirement
- Low On-resistance
- Fast Switching Characteristic
- Pb-free lead plating and Halogen-free package

Symbol

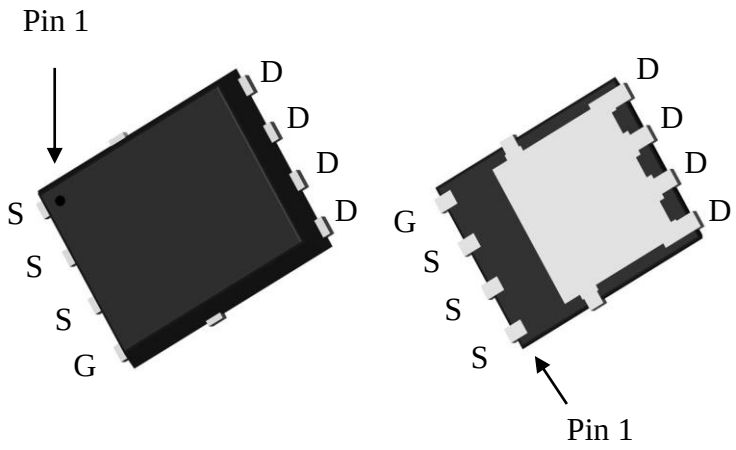
MTD9D0P03H8



G：Gate D：Drain S：Source

Outline

DFN5x6



Ordering Information

Device	Package	Shipping
MTD9D0P03H8-0-T6-G	DFN5x6 (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel

Environment friendly grade : S for RoHS compliant products, G for RoHS compliant and green compound products

Packing spec, T6 : 3000 pcs / tape & reel,13” reel

Product rank, zero for no rank products

Product name

Absolute Maximum Ratings (Ta=25°C)

Parameter		Symbol	10s	Steady State	Unit
Drain-Source Voltage		V_{DS}	-30		V
Gate-Source Voltage		V_{GS}	±20		
Continuous Drain Current @ T_C=25°C, V_{GS}=-10V (Note1)		I_D	-55		A
Continuous Drain Current @ T_C=100°C, V_{GS}=-10V (Note1)			-34.8		
Continuous Drain Current @ T_A=25°C, V_{GS}=-10V (Note2)		I_{DSM}	-18.4	-10.8	
Continuous Drain Current @ T_A=70°C, V_{GS}=-10V (Note2)			-14.7	-8.6	
Pulsed Drain Current (Note3)		I_{DM}	-210		
Avalanche Current@L=0.1mH (Note4)		I_{AS}	-50		
Avalanche Energy @ L=1mH, I_D=-24A, V_{DD}=-15V (Note4)		E_{AS}	288		mJ
Total Power Dissipation	T_C=25℃ (Note1)	P_D	50		W
	T_C=100℃ (Note1)		20		
	T_A=25°C (Note2)	P_{DSM}	5.4	1.9	
	T_A=70°C (Note2)		3.5	1.2	
Operating Junction and Storage Temperature Range		Tj, Tstg	-55~+150		°C

Thermal Data

Parameter		Symbol	Typical	Maximum	Unit
Thermal Resistance, Junction-to-case		$R_{\theta JC}$	2.2	2.5	°C/W
Thermal Resistance, Junction-to-ambient (Note2)	t≤10s	$R_{\theta JA}$	18	23	
	Steady State		50	65	

Note : 1. The power dissipation P_D is based on $T_{J(MAX)}$=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

2. The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2 oz. copper, in a still air environment with T_A=25°C. The power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.

3. Pulse width limited by junction temperature $T_{J(MAX)}$=150°C.

4. Ratings are based on low frequency and low duty cycles to keep initial T_J=25°C. 100% tested by conditions of L=0.1mH, I_{AS}=-10A, V_{GS}=-10V, V_{DD}=-15V.

Characteristics (T_C=25°C, unless otherwise specified)

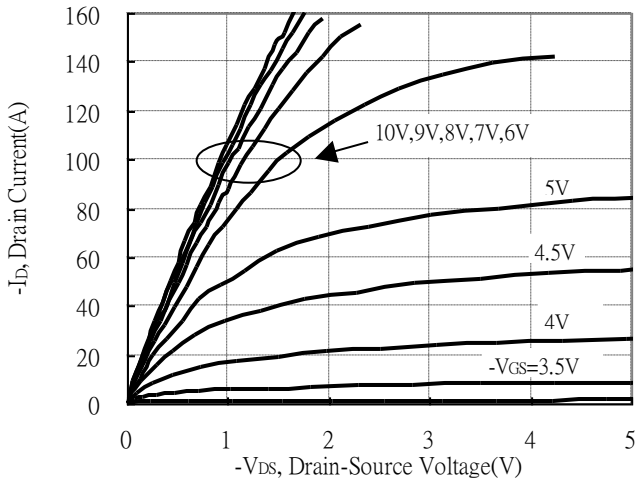
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	-30	-	-	V	V_{GS}=0V, I_D=-250μA
$V_{GS(th)}$	-1.5	-	-3.0		V_{DS} = V_{GS}, I_D=-250μA
G_{FS} *1	-	15	-	S	V_{DS} =-10V, I_D=-5A
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	-1	μA	V_{DS} =-24V, V_{GS} =0V
	-	-	-10		V_{DS} =-24V, V_{GS} =0, Tj=70°C
$R_{DS(ON)}$ *1	-	8.1	11	mΩ	V_{GS} =-10V, I_D=-20A
	-	18	25		V_{GS} =-5V, I_D=-12A

Dynamic *4					
Ciss	-	2243	-	pF	V_{DS}=-25V, V_{GS}=0V, f=1MHz
Coss	-	280	-		
Crss	-	229	-		
Qg *1, 2	-	44.7	-	nC	V_{DS}=-20V, V_{GS}=-10V, I_D=-20A
Qgs *1, 2	-	9	-		
Qgd *1, 2	-	12.4	-		
$t_{d(ON)}$ *1, 2	-	16.4	-	ns	V_{DS}=-20V, I_D=-20A, V_{GS}=-10V R_G=3Ω
tr *1, 2	-	20.6	-		
$t_{d(OFF)}$ *1, 2	-	64.8	-		
t_f *1, 2	-	22.4	-		
Rg	-	4	-	Ω	f=1MHz
Source-Drain Diode					
I_S *1	-	-	-41	A	
I_{SM} *3	-	-	-164		
V_{SD} *1	-	-0.89	-1.2	V	I_S=-20A, V_{GS}=0V
trr	-	15	-	ns	I_F=-20A, dI_F/dt=100A/μs
Qrr	-	8.8	-	nC	

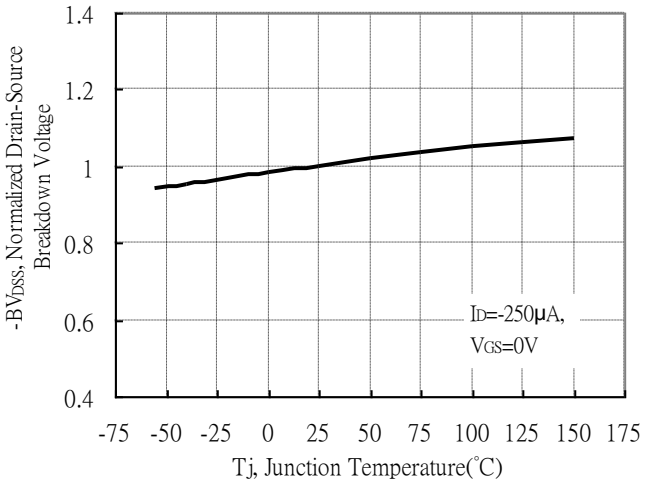
Note : *1.Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%
*2.Independent of operating temperature
*3.Pulse width limited by maximum junction temperature.
*4.Guaranteed by design, not subject to production testing.

Typical Characteristics

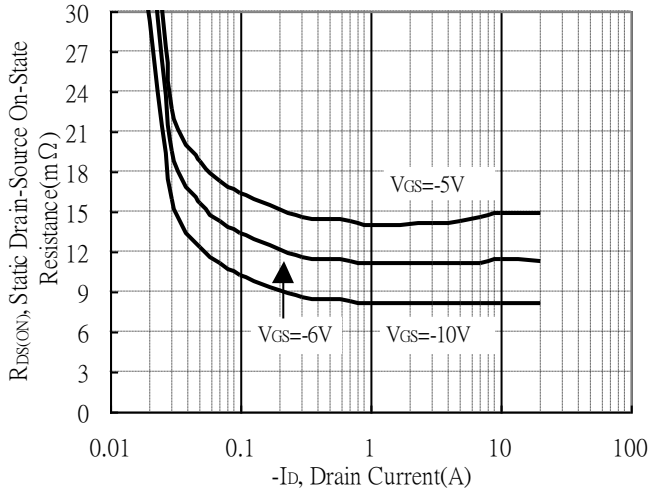
Typical Output Characteristics



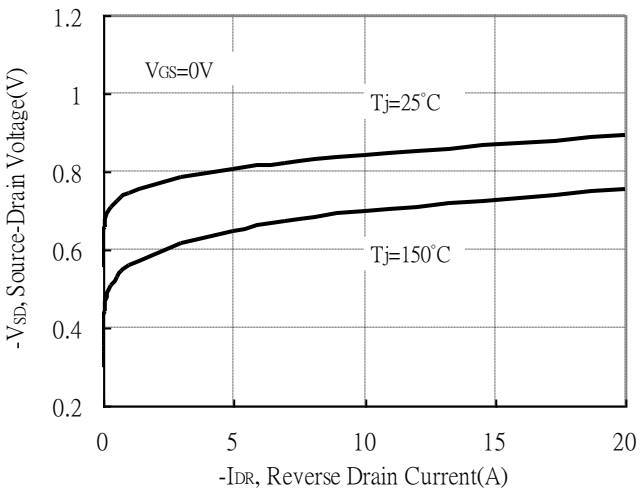
Brekdown Voltage vs Ambient Temperature



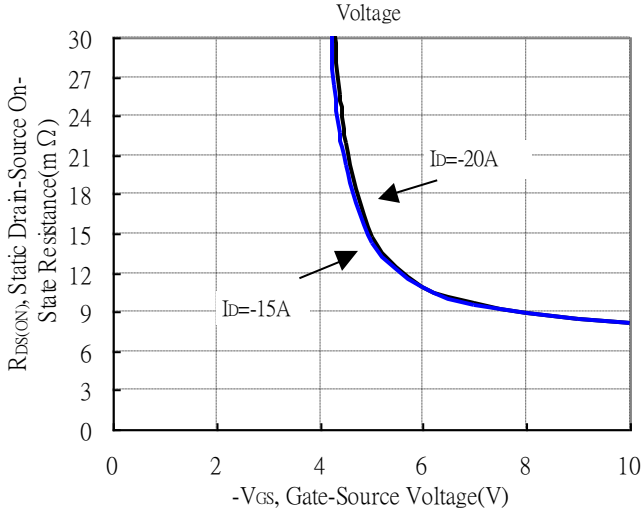
Static Drain-Source On-State resistance vs Drain Current



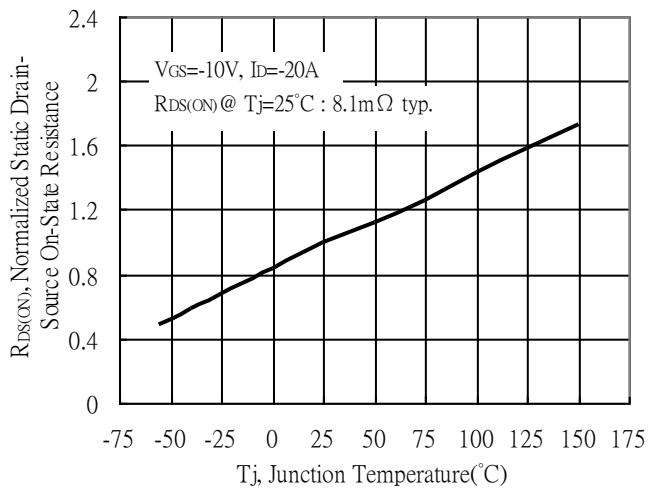
Reverse Drain Current vs Source-Drain Voltage



Static Drain-Source On-State Resistance vs Gate-Source Voltage

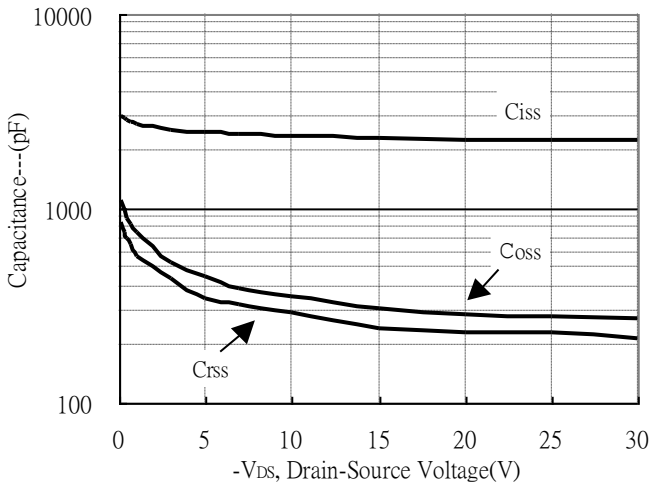


Drain-Source On-State Resistance vs Junction Tempearture

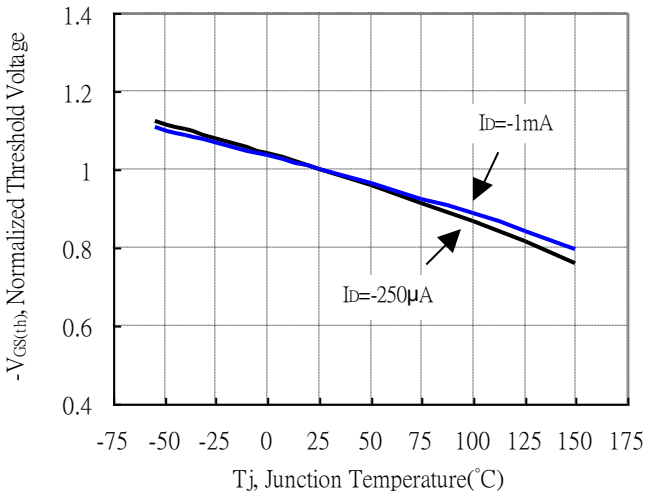


Typical Characteristics(Cont.)

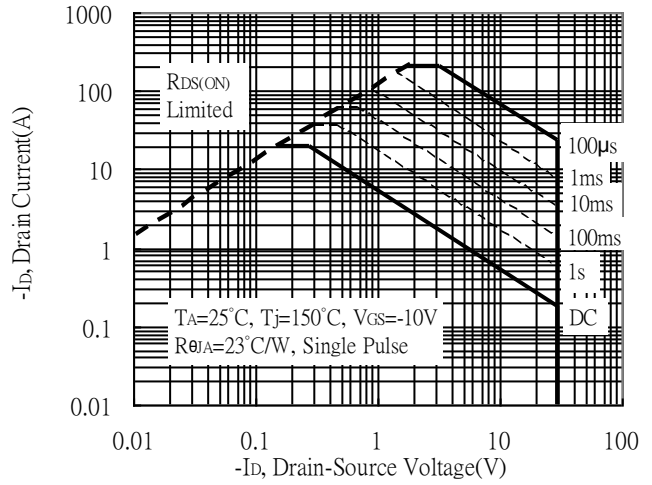
Capacitance vs Drain-to-Source Voltage



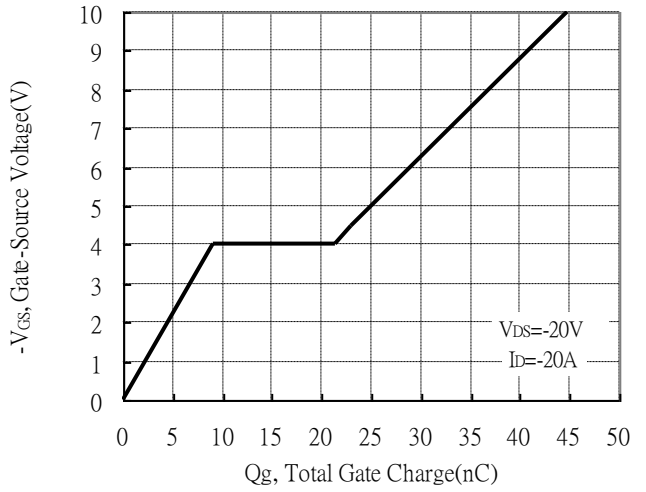
Threshold Voltage vs Junction Tempearture



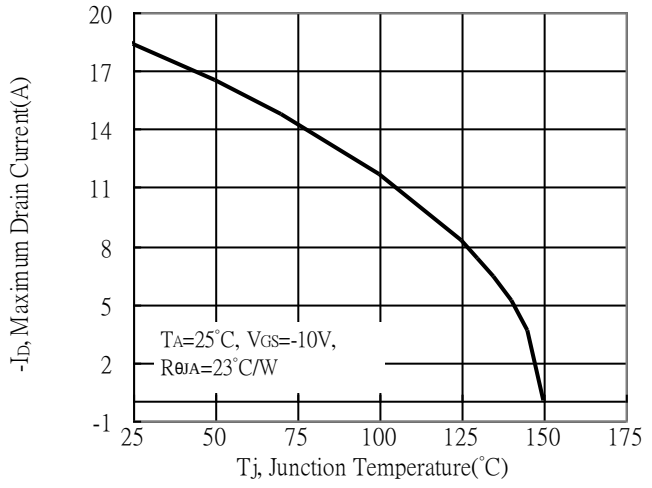
Maximum Safe Operating Area



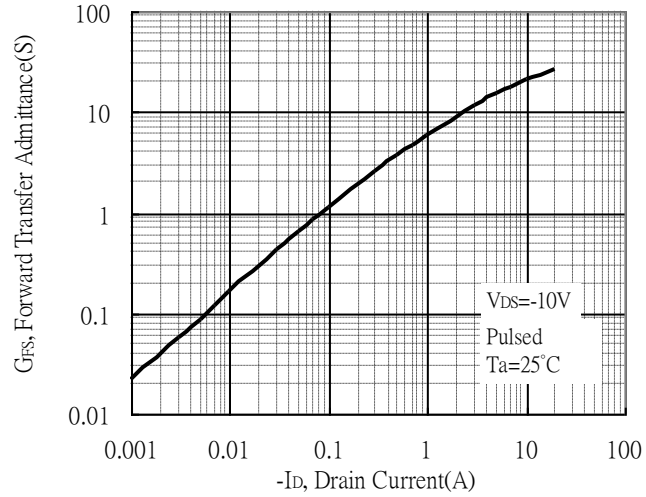
Gate Charge Characteristics



Maximum Drain Current vs Junction Temperature

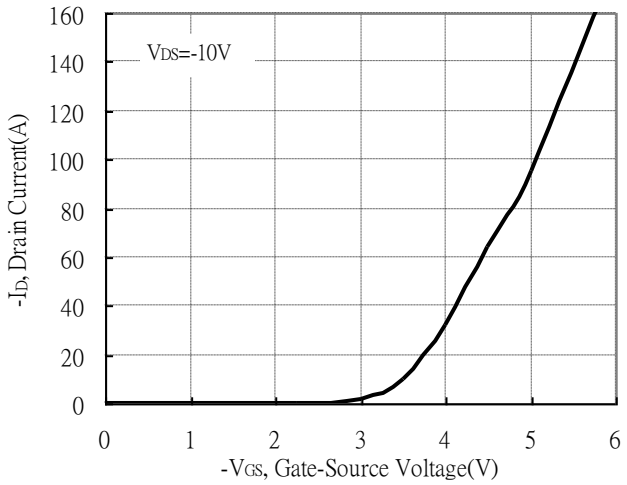


Forward Transfer Admittance vs Drain Current

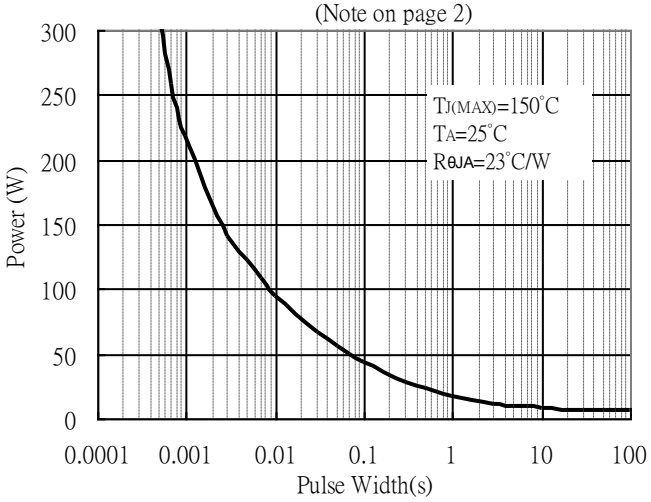


Typical Characteristics(Cont.)

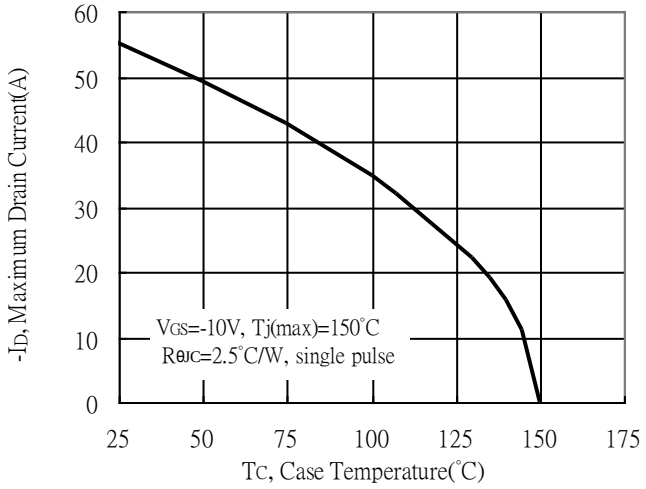
Typical Transfer Characteristics



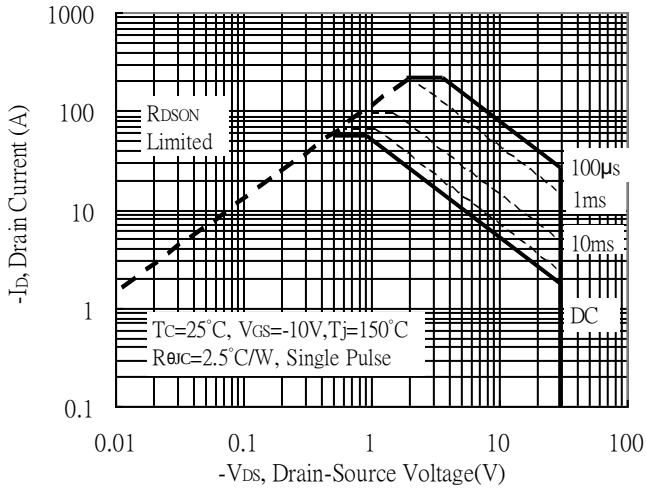
Single Pulse Power Rating, Junction to Ambient
(Note on page 2)



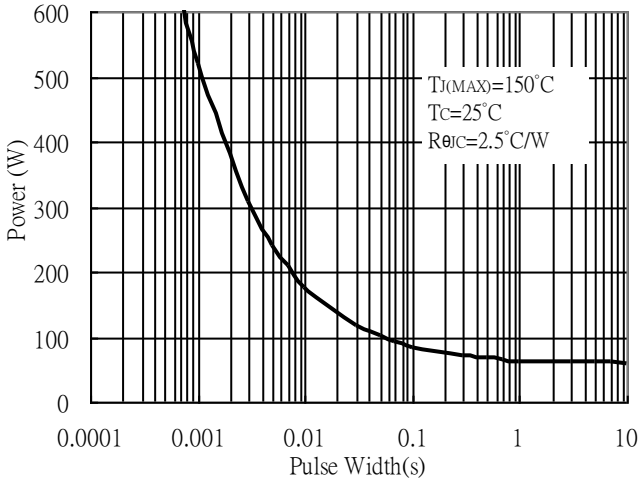
Maximum Drain Current vs Case Temperature



Maximum Safe Operating Area

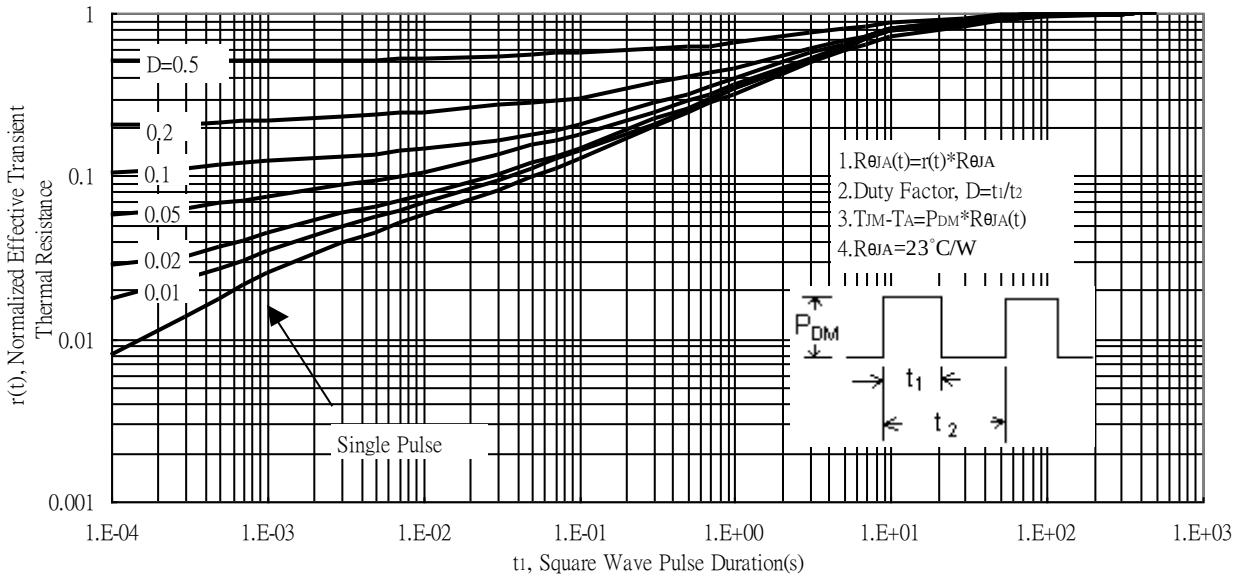


Single Pulse Maximum Power Dissipation

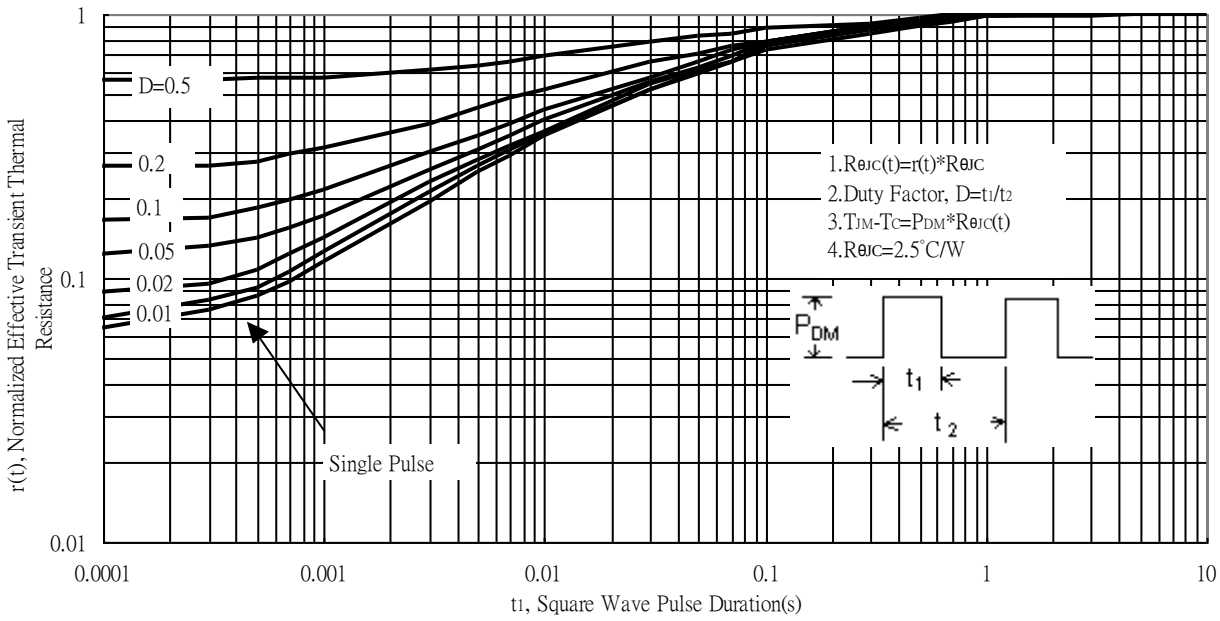


Typical Characteristics(Cont.)

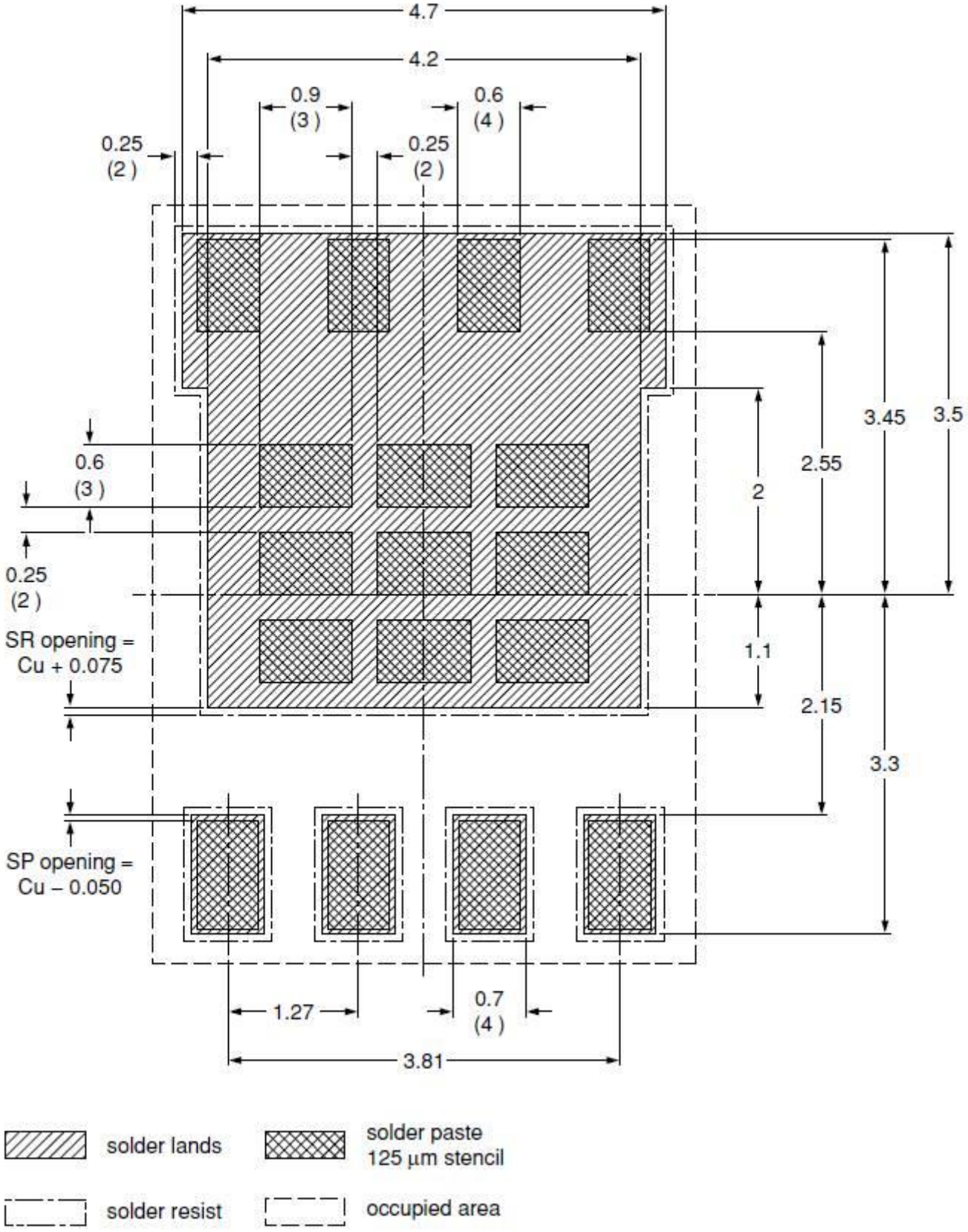
Transient Thermal Response Curves



Transient Thermal Response Curves

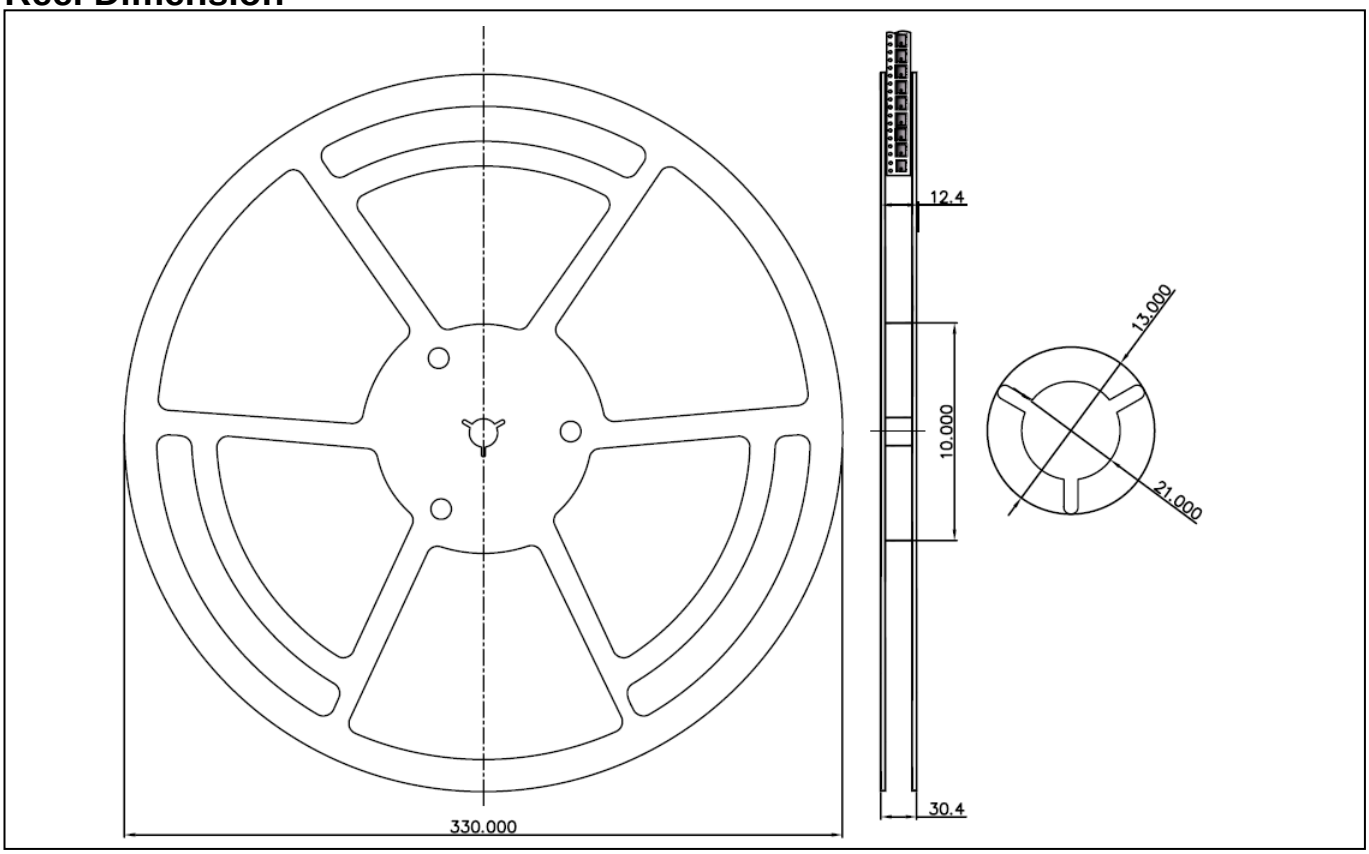


Recommended Soldering Footprint & Stencil Design

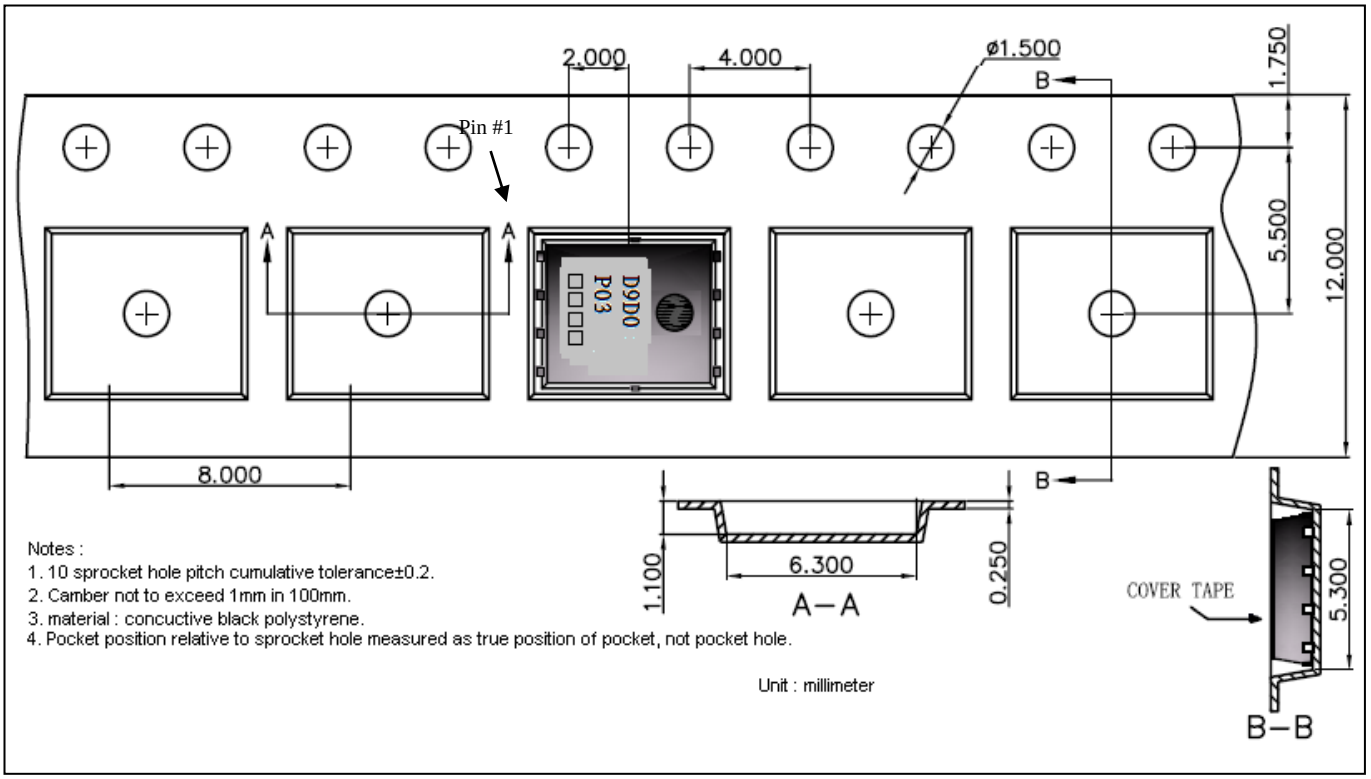


unit : mm

Reel Dimension



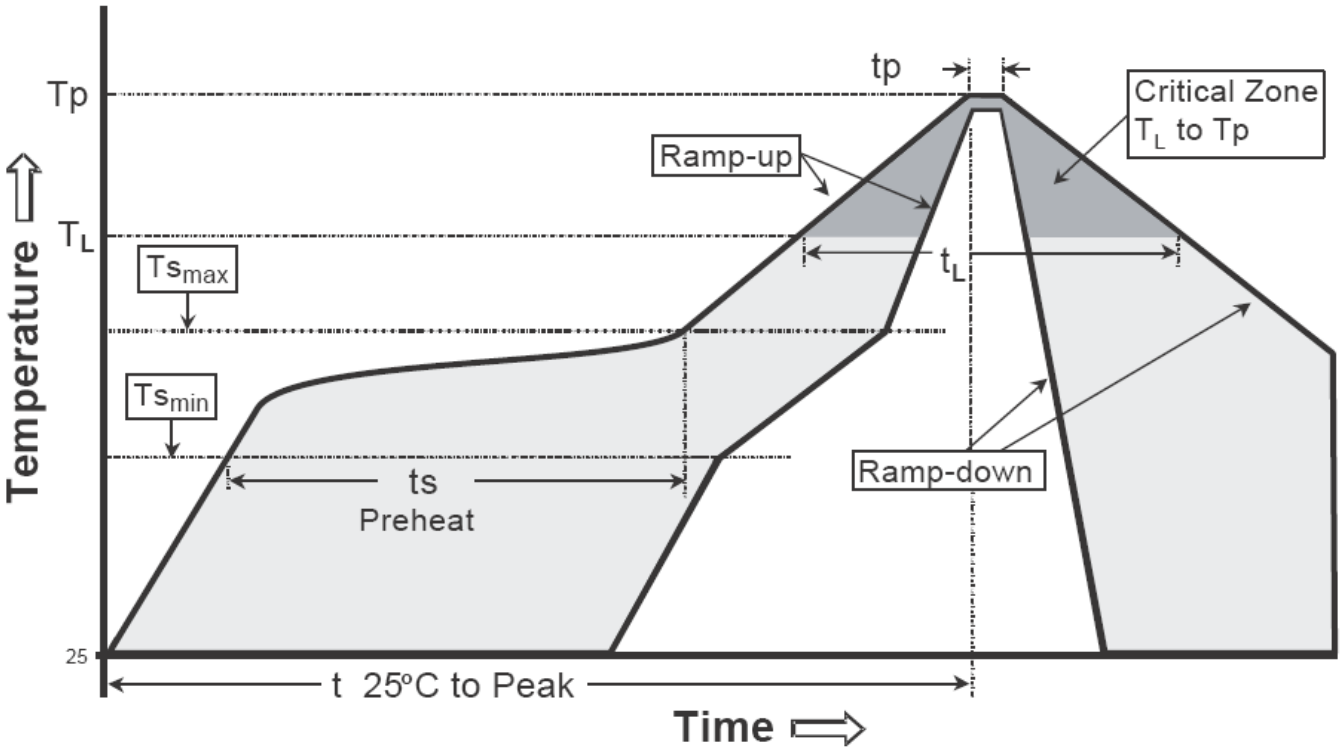
Carrier Tape Dimension



Recommended wave soldering condition

Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

Recommended temperature profile for IR reflow

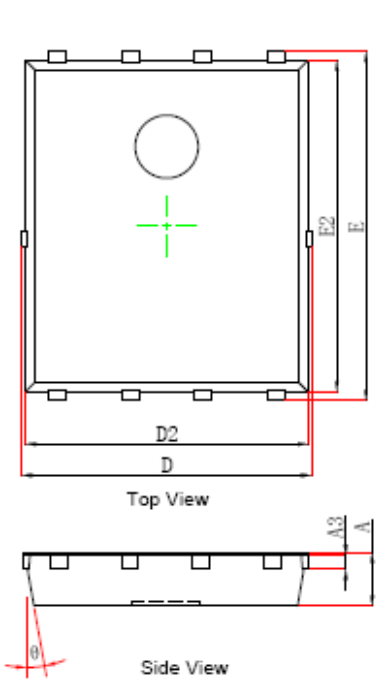


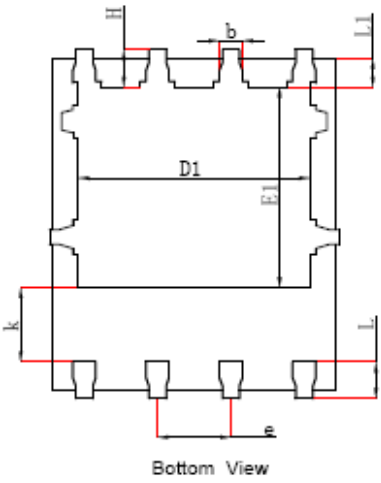
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(Ts min) −Temperature Max(Ts max) −Time(ts min to ts max)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (TL) − Time (tL)	 183°C 60-150 seconds	 217°C 60-150 seconds
Peak Temperature(TP)	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(tp)	10-30 seconds	20-40 seconds
Ramp down rate	6°C/second max.	6°C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

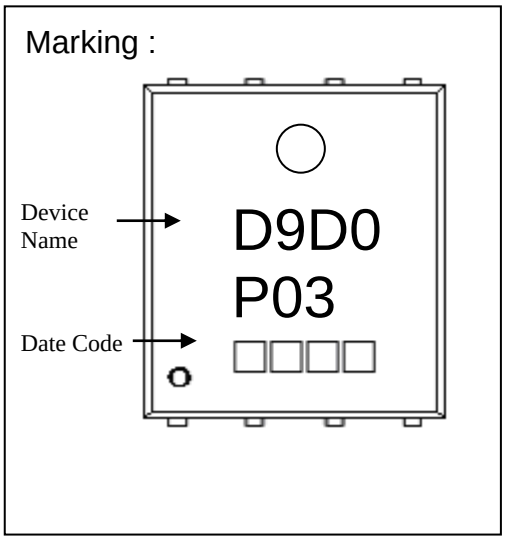
Note :1. All temperatures refer to topside of the package, measured on the package body surface.

2.For devices mounted on FR-4 PCB of 1.6mm or equivalent grade PCB. If other grade PCB is used, care should be taken to match the coefficients of thermal expansion between components and PCB. If they are not matched well, the solder joints may crack or the bodies of the parts may crack or shatter as the assembly cools.

DFN5x6 Dimension







8-Lead DFN5x6 Plastic Package
CYS Package Code : H8

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039	k	1.190	1.390	0.047	0.055
A3	0.254 REF		0.010 REF		b	0.350	0.450	0.014	0.018
D	4.944	5.096	0.195	0.201	e	1.270 TYP.		0.050 TYP.	
E	5.974	6.126	0.235	0.241	L	0.559	0.711	0.022	0.028
D1	3.910	4.110	0.154	0.162	L1	0.424	0.576	0.017	0.023
E1	3.375	3.575	0.133	0.141	H	0.574	0.726	0.023	0.029
D2	4.824	4.976	0.190	0.196	θ	10°	12°	10°	12°
E2	5.674	5.826	0.223	0.229					

Notes: 1.Controlling dimension: millimeters.
2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.
3.If there is any question with packing specification or packing method, please contact your local CYStek sales office.

Material:

- Lead: Pure tin plated.
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0.