N-Channel Enhancement Mode Power MOSFET

MTB7D0N06RH8

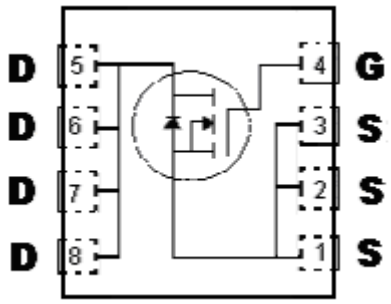
BV_{DSS}	**60V**
I_D@V_{GS}=10V, T_C=25°C	**52A**
I_D@V_{GS}=10V, T_A=25°C	**12A**
$R_{DS(ON)}$@V_{GS}=10V, I_D=20A	**5.1mΩ(typ)**
$R_{DS(ON)}$@V_{GS}=4.5V, I_D=18A	**9.2mΩ(typ)**

Features

- Low On Resistance
- Simple Drive Requirement
- Low Gate Charge
- Fast Switching Characteristic
- Pb-free lead plating and Halogen-free package

Symbol

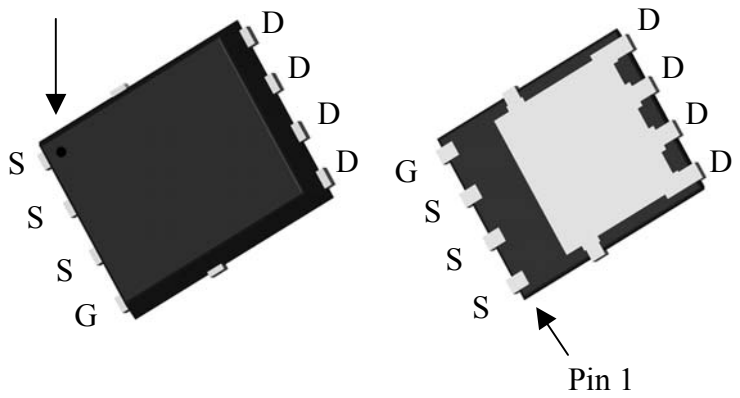
MTB7D0N06RH8



G：Gate D：Drain S：Source

Outline

DFN5×6



Ordering Information

Device	Package	Shipping
MTB7D0N06RH8-0-T6-G	DFN 5 ×6 (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 (T_C=25°C, unless otherwise noted)

Parameter		Symbol	Limits	Unit
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current @T_C=25°C, V_{GS}=10V (Note 5)		I_D	52	A
Continuous Drain Current @T_C=100°C, V_{GS}=10V (Note 5)			32.9	
Continuous Drain Current @T_A=25°C, V_{GS}=10V (Note 2)		I_{DSM}	12	
Continuous Drain Current @T_A=70°C, V_{GS}=10V (Note 2)			9.6	
Pulsed Drain Current @ V_{GS}=10V (Note 3)		I_{DM}	208	
Avalanche Current @L=0.1mH (Note 3)		I_{AS}	52	
Single Pulse Avalanche Energy @ L=1mH, I_D=20Amps, V_{DD}=30V (Note 4)		E_{AS}	200	mJ
Repetitive Avalanche Energy (Note 3)		E_{AR}	5	
Power Dissipation	T_C=25°C (Note 1)	P_D	50	W
	T_C=100°C (Note 1)		20	
	T_A=25°C (Note 2)	P_{DSM}	2.5	
	T_A=70°C (Note 2)		1.6	
Operating Junction and Storage Temperature		Tj, Tstg	-55~+150	°C

*Drain current limited by maximum junction temperature

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{\theta JC}$	2.5	°C/W
Thermal Resistance, Junction-to-ambient, max (Note 2)	$R_{\theta JA}$	50	

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 value in any given application depends on the user's specific board design. The power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C.

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 V_{DD}=25V, I_D=20A, L=0.1mH, V_{GS}=10V.

5. Calculated continuous drain current based on maximum allowable junction temperature.

6. The static characteristics are obtained using <300μs pulses, duty cycle 0.5% maximum.

7. The $R_{\theta JA}$ is the sum of thermal resistance from junction to case $R_{\theta JC}$ and case to ambient.

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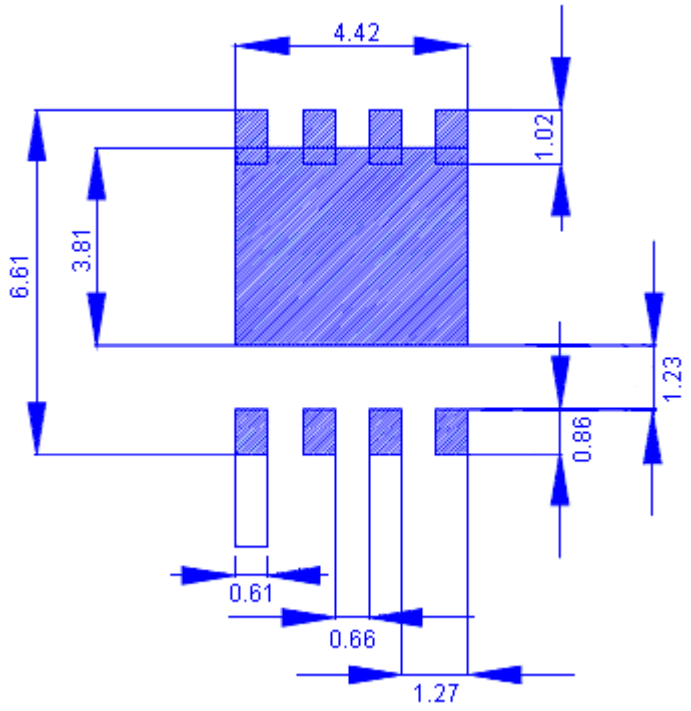
Characteristics (Tj=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	60	-	-	V	V_{GS}=0V, I_D=250μA
$\Delta BV_{DSS}/\Delta Tj$	-	0.03	-	V/°C	Reference to 25°C, I_D=250μA
$V_{GS(th)}$	1	-	2.5	V	V_{DS} = V_{GS}, I_D=250μA
*G_{FS}	-	23	-	S	V_{DS} =10V, I_D=20A
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	1	μA	V_{DS} =48V, V_{GS} =0V
	-	-	5		V_{DS} =48V, V_{GS} =0V, Tj=55°C
*$R_{DS(ON)}$	-	5.1	7	mΩ	V_{GS} =10V, I_D=20A
		9.2	13		V_{GS} =4.5V, I_D=18A
Dynamic					
*Qg	-	46.8	-	nC	V_{DS}=48V, I_D=20A, V_{GS}=10V
*Qgs	-	9.7	-		
*Qgd	-	9.5	-		
*$t_{d(ON)}$	-	19.4	-	ns	V_{DS}=30V, I_D=20A, V_{GS}=10V, R_G=3Ω
*tr	-	17	-		
*$t_{d(OFF)}$	-	54.2	-		
*t_f	-	9.6	-		
Ciss	-	2931	-	pF	V_{GS}=0V, V_{DS}=30V, f=1MHz
Coss	-	375	-		
Crss	-	17	-		
Rg	-	1.7	-	Ω	f=1MHz
Source-Drain Diode					
*I_S	-	-	52	A	
*I_{SM}	-	-	208		
*V_{SD}	-	0.86	1.2	V	I_S=20A, V_{GS}=0V
*trr	-	23	-	ns	V_{GS}=0, I_F=20A, dI_F/dt=100A/μs
*Qrr	-	18.5	-	nC	

*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

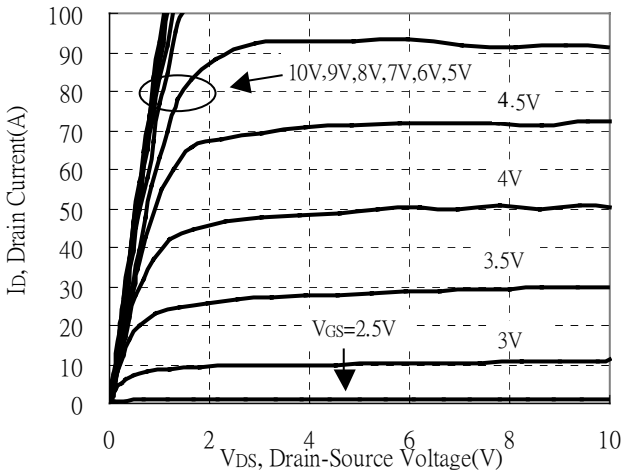
Recommended Soldering Footprint



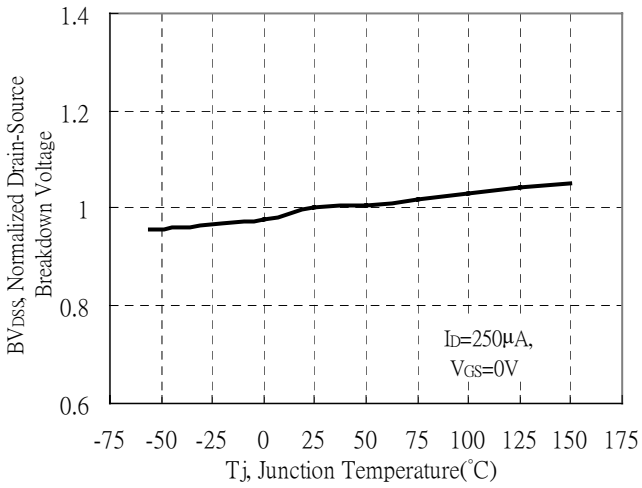
unit : mm

Typical Characteristics

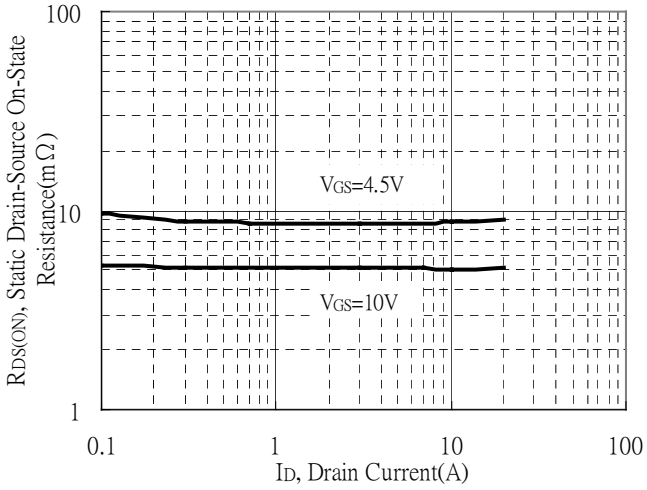
Typical Output Characteristics



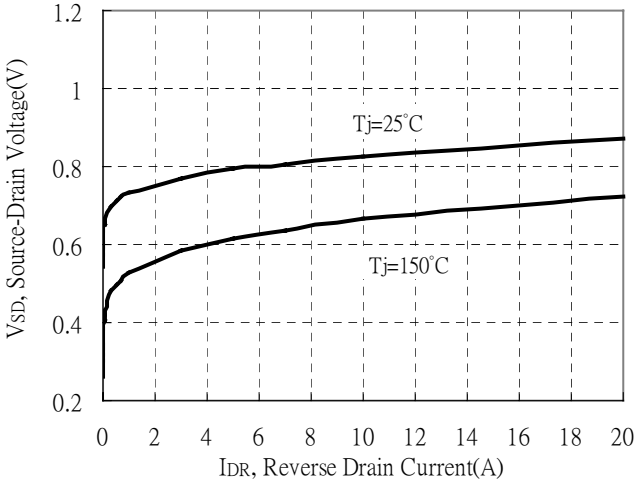
Brekdown Voltage vs Ambient Temperature



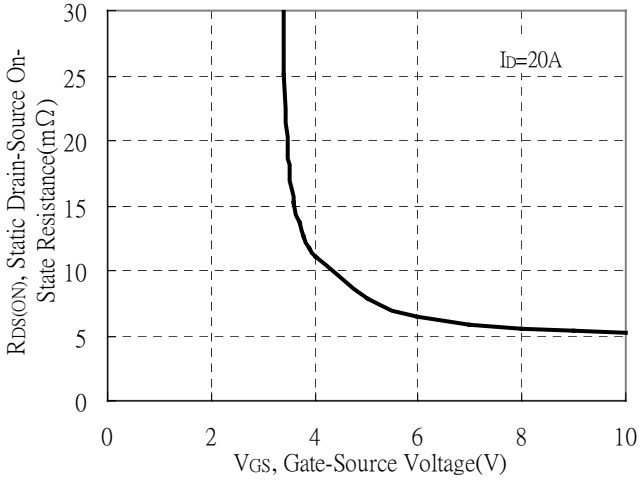
Static Drain-Source On-State resistance vs Drain Current



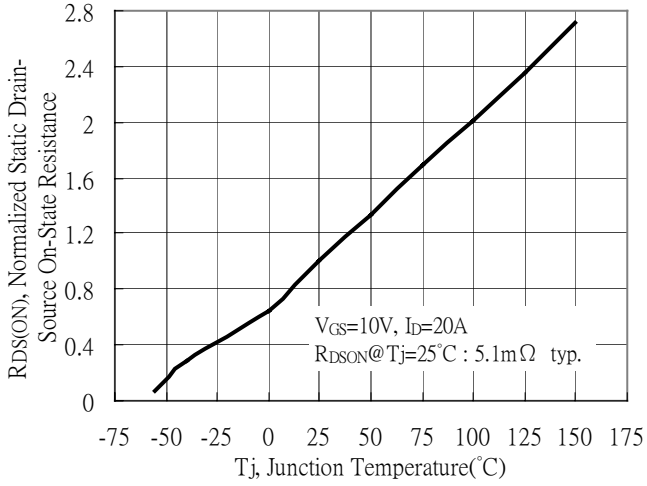
Reverse Drain Current vs Source-Drain Voltage



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

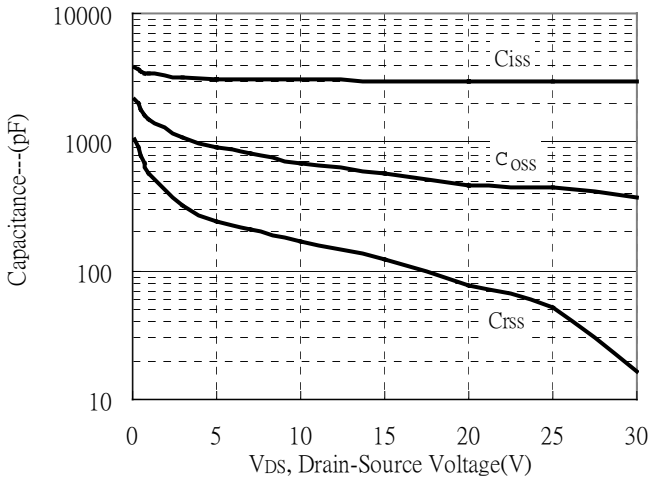


Drain-Source On-State Resistance vs Junction Tempearture

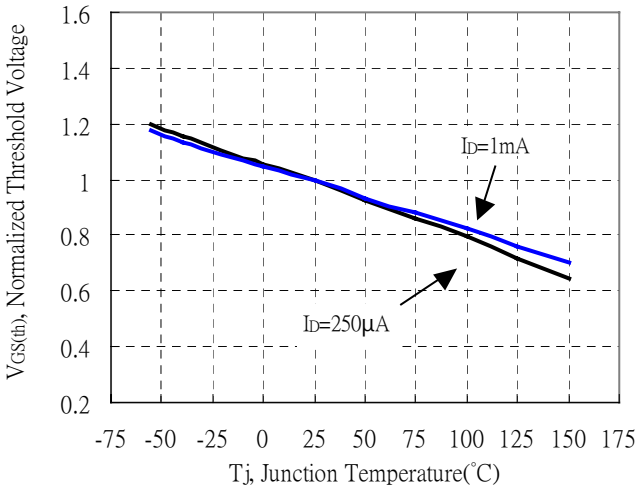


Typical Characteristics(Cont.)

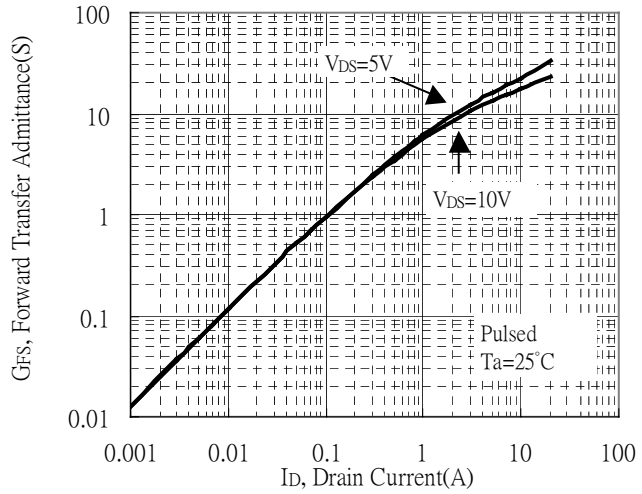
Capacitance vs Drain-to-Source Voltage



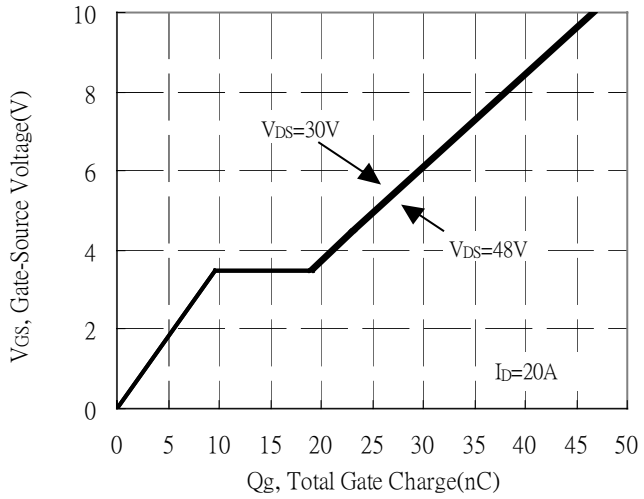
Threshold Voltage vs Junction Tempearture



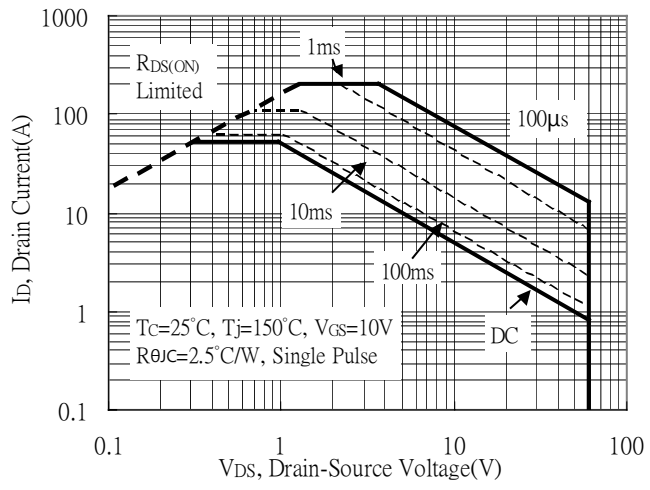
Forward Transfer Admittance vs Drain Current



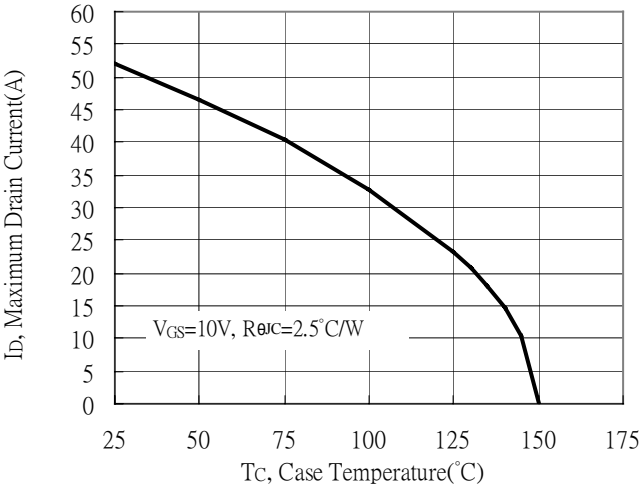
Gate Charge Characteristics



Maximum Safe Operating Area

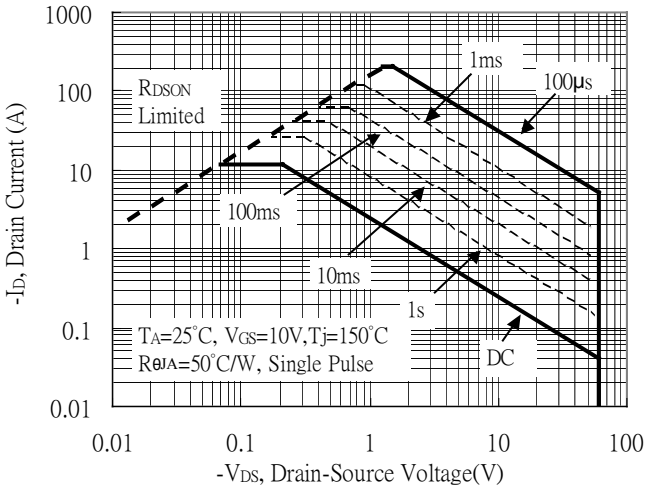


Maximum Drain Current vs Case Temperature

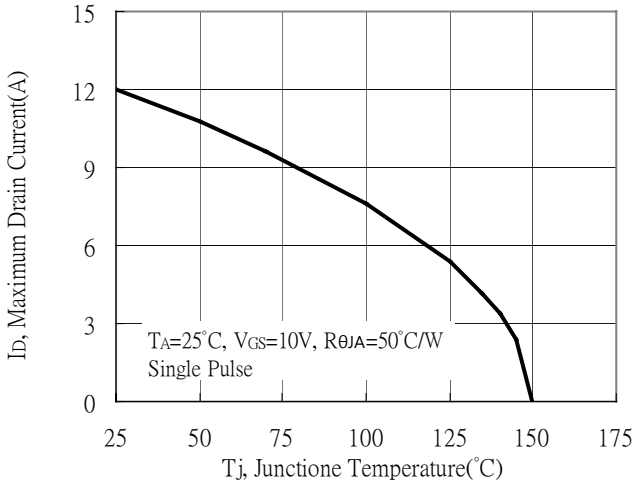


Typical Characteristics(Cont.)

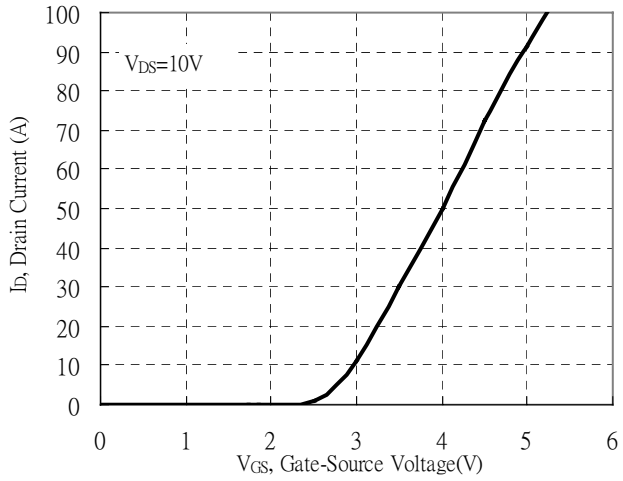
Maximum Safe Operating Area



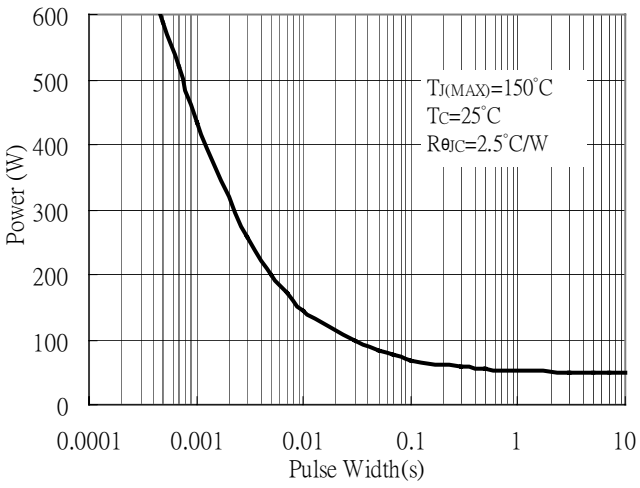
Maximum Drain Current vs Junction Temperature



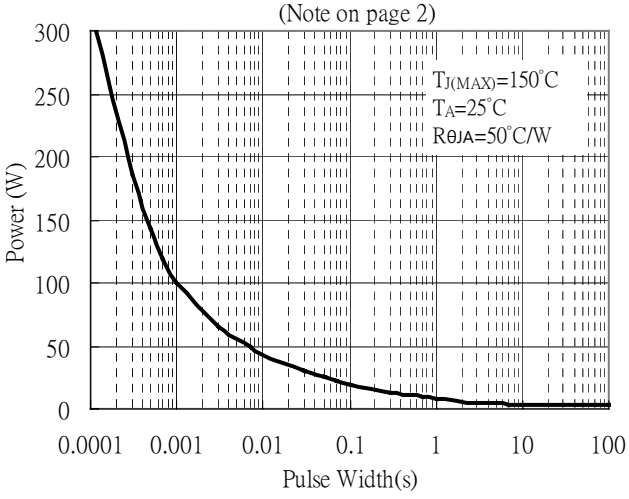
Typical Transfer Characteristics



Single Pulse Maximum Power Dissipation

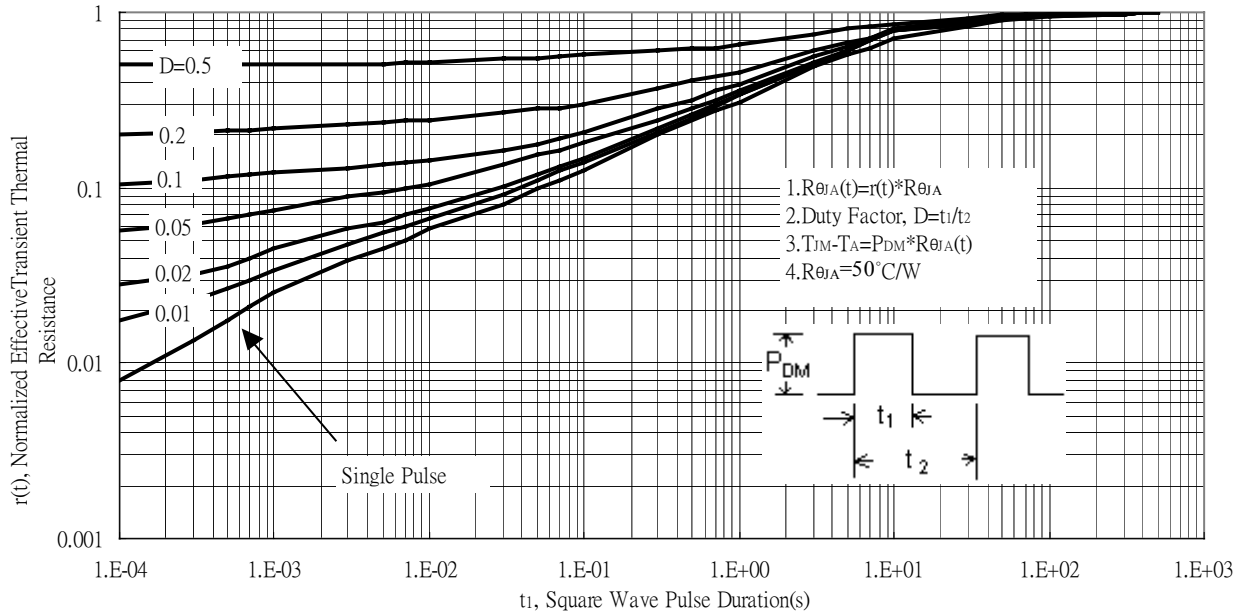


Single Pulse Power Rating, Junction to Ambient
(Note on page 2)

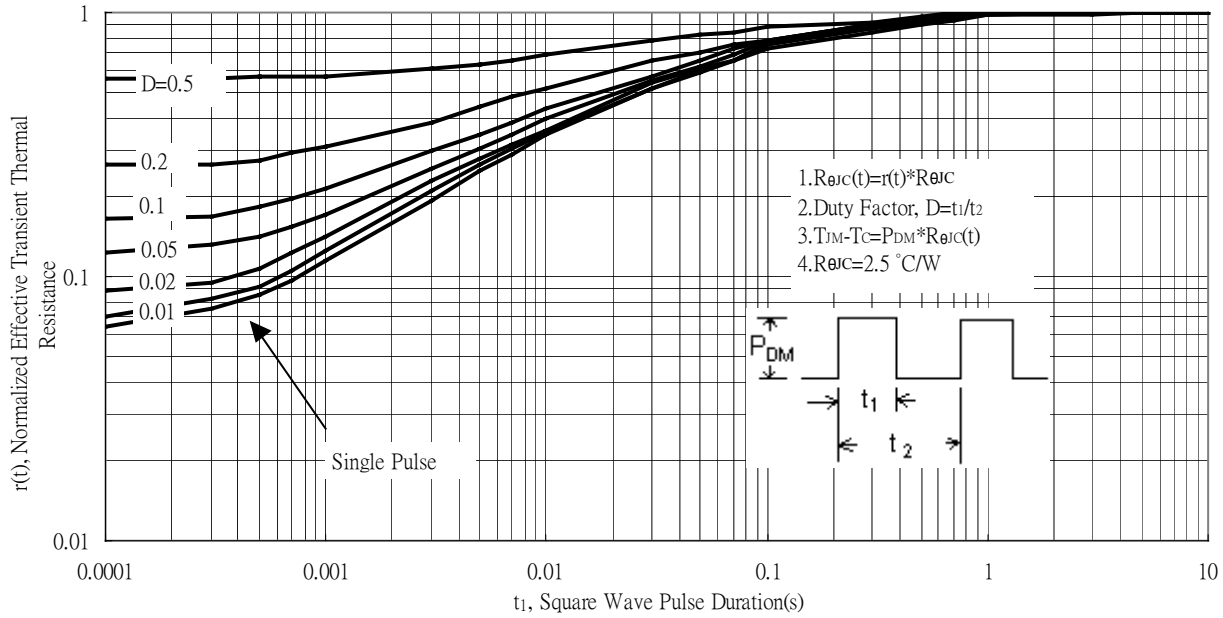


Typical Characteristics(Cont.)

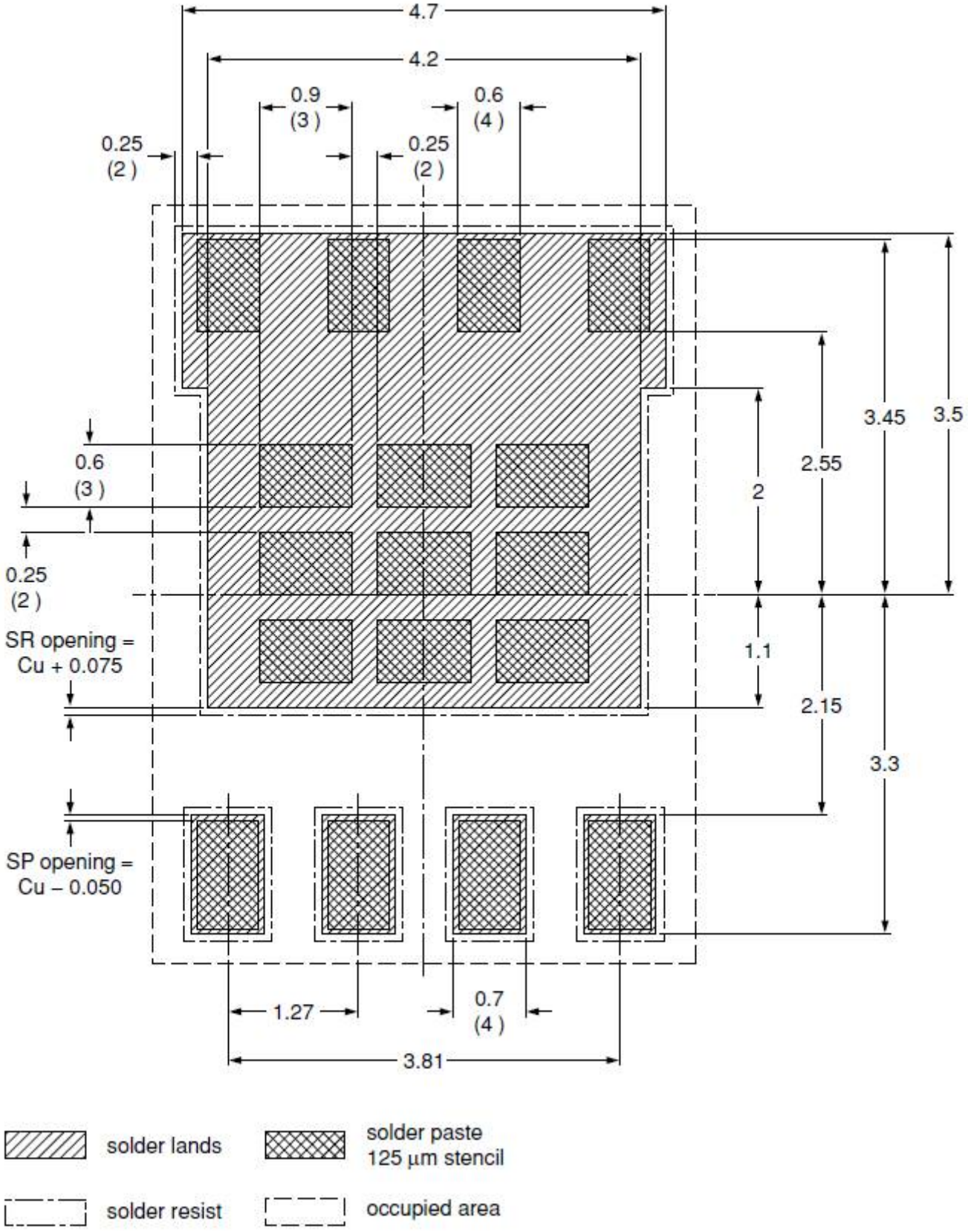
Transient Thermal Response Curves



Transient Thermal Response Curves

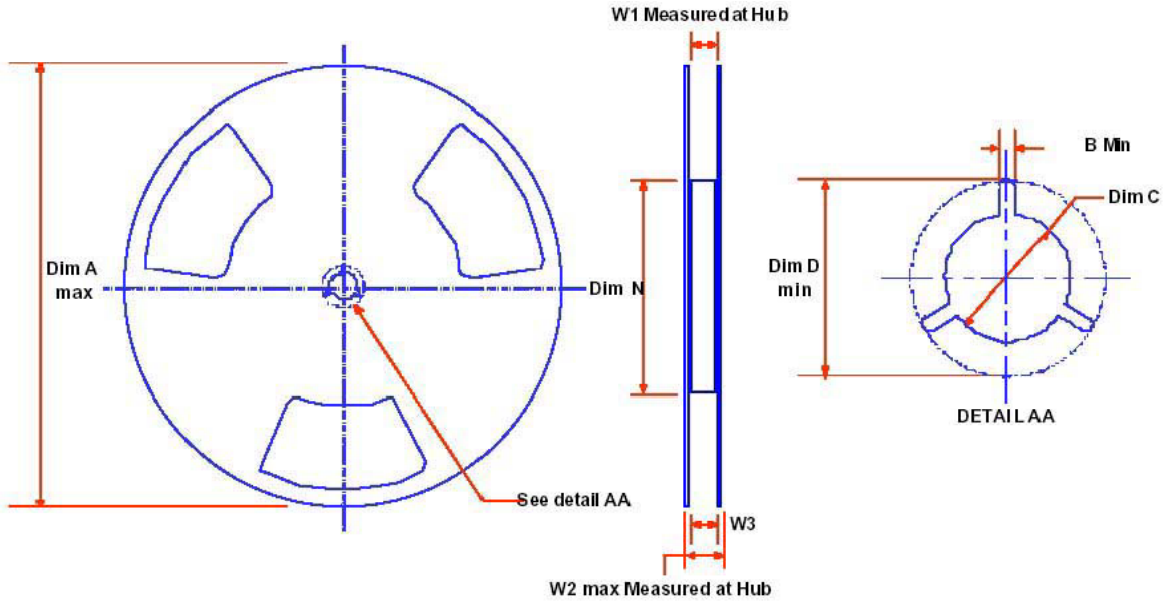


Recommended Soldering Footprint & Stencil Design



unit : mm

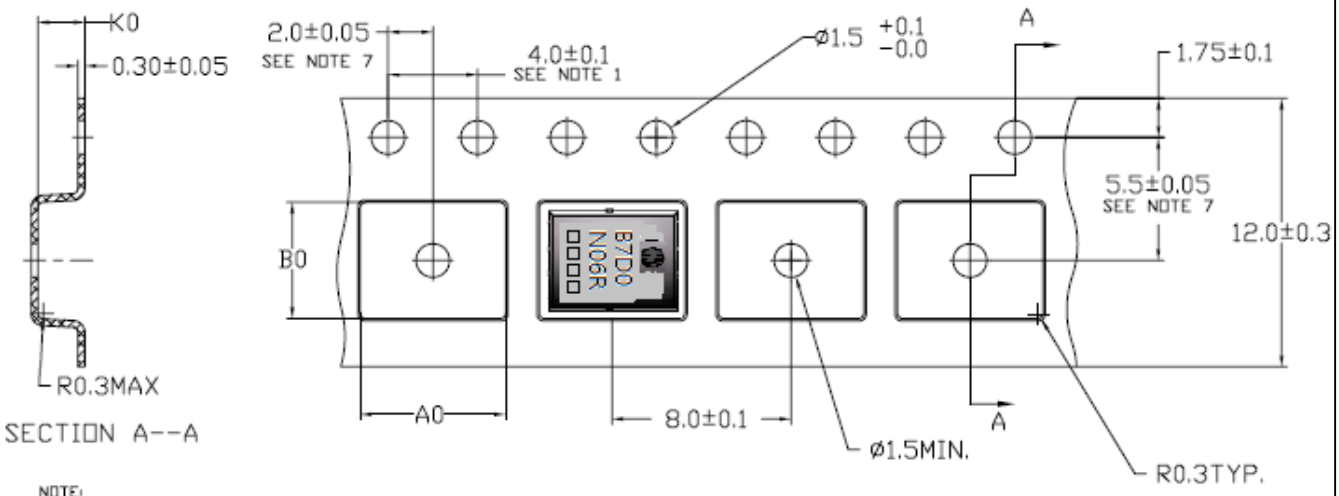
Reel Dimension



Dimensions are in inches and millimeters

Tape Size	Reel Option	Dim A	Dim B	Dim C	Dim D	Dim N	Dim W1	Dim W2	Dim W3 (LSL-USL)
12mm	13" Dia (STD/L99Z)	13.00 330+/-1	0.059 1.5 Min.	0.512 13.0 Min.	0.795 20.2(ref.)	7.00 178+0/-2	0.488 +0.078/-0.000 12.4 +2/0	0.724 18.4(ref.)	0.469 – 0.606 11.9 – 15.4

Carrier Tape Dimension



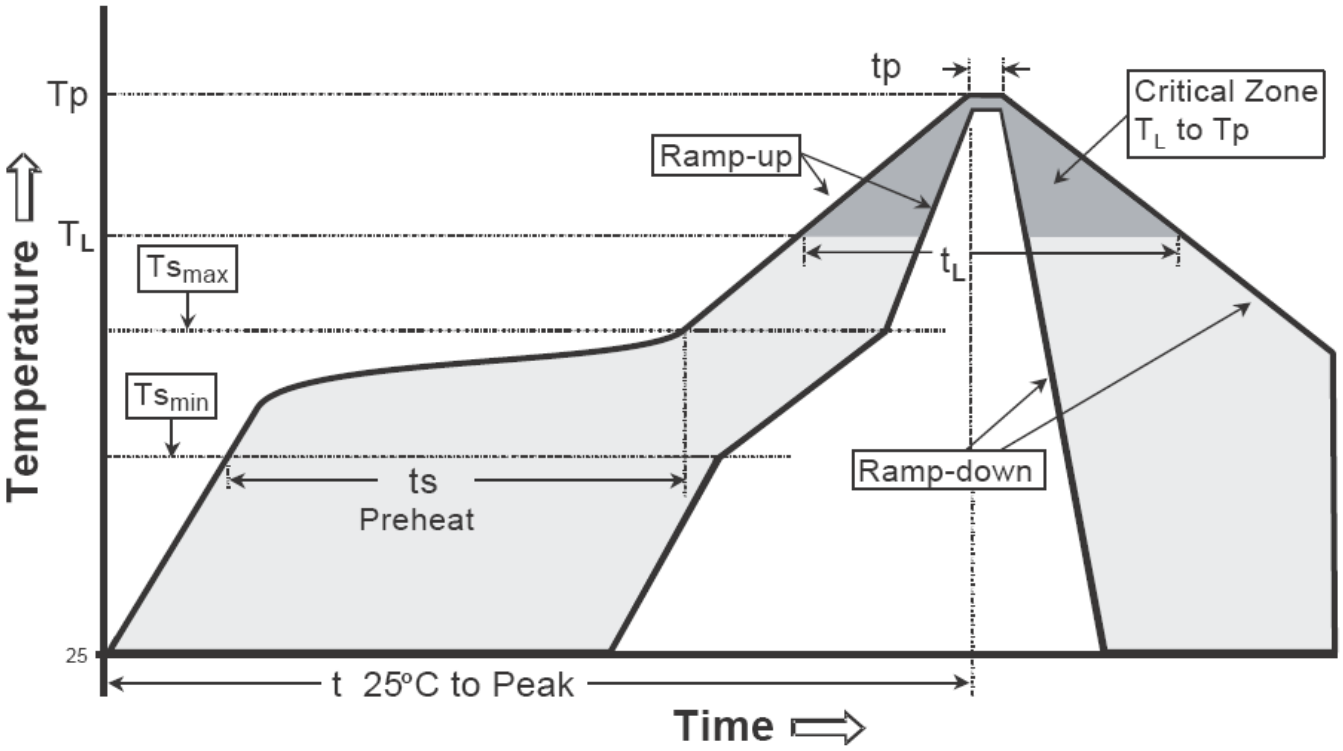
NOTE:
1. 10 SPROCKET HOLE PITCH CUMULATIVE TOLERANCE ±0.2
2. CAMBER NOT TO EXCEED 1mm IN 100mm, NONCUMULATIVE OVER 250mm.
3. MATERIAL: BLACK STATIC DISSIPATIVE PS.(POLYSTYRENE)
4. ALL DIMENSIONS ARE IN MILLIMETERS (UNLESS OTHERWISE SPECIFIED)
5. A0 AND B0 MEASURED ON A PLANE 0.3mm ABOVE THE BOTTOM OF THE POCKET
6. K0 MEASURED FROM A PLANE ON THE INSIDE BOTTOM OF THE POCKET TO THE TOP SURFACE OF THE CARRIER
7. POCKET POSITION RELATIVE TO SPROCKET HOLE MEASURED AS TRUE POSITION OF POCKET, NOT POCKET HOLE
8. SURFACE RESISTIVITY
   1X10E4~1X10E11 OHMS/SQ.
   1X10E4~1X10E6 OHMS/SQ. for Fairchild Only

A0=6.5±0.1
B0=5.3±0.1
K0=1.4±0.1

Recommended wave soldering condition

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

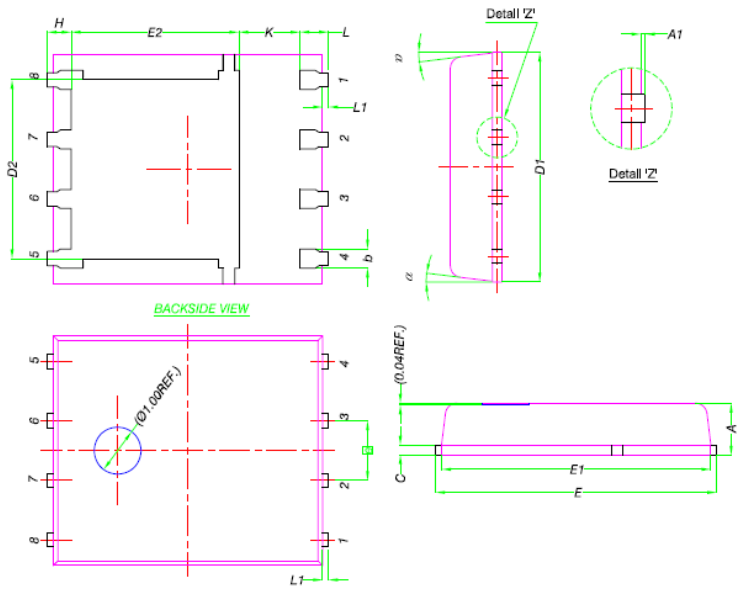
Recommended temperature profile for IR reflow

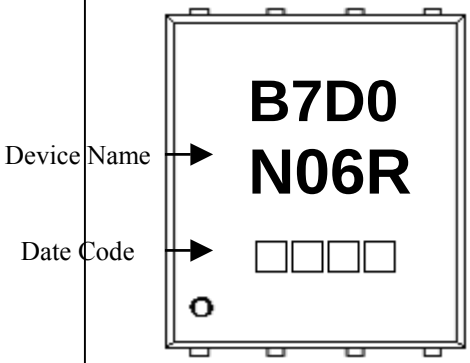


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(Ts min) −Temperature Max(Ts max) −Time(ts min to ts max)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (TL) − 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	0.90	1.10	0.035	0.043	E2	3.38	3.78	0.133	0.149
A1	0.00	0.05	0.000	0.002	e	1.27 BSC		0.050 BSC	
b	0.33	0.51	0.013	0.020	H	0.41	0.61	0.016	0.024
C	0.20	0.30	0.008	0.012	K	1.10	-	0.043	-
D1	4.80	5.00	0.189	0.197	L	0.51	0.71	0.020	0.028
D2	3.61	3.96	0.142	0.156	L1	0.06	0.20	0.002	0.008
E	5.90	6.10	0.232	0.240	θ	8°	12°	8°	12°
E1	5.70	5.80	0.224	0.228					

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.