

N-Channel Enhancement Mode Power MOSFET

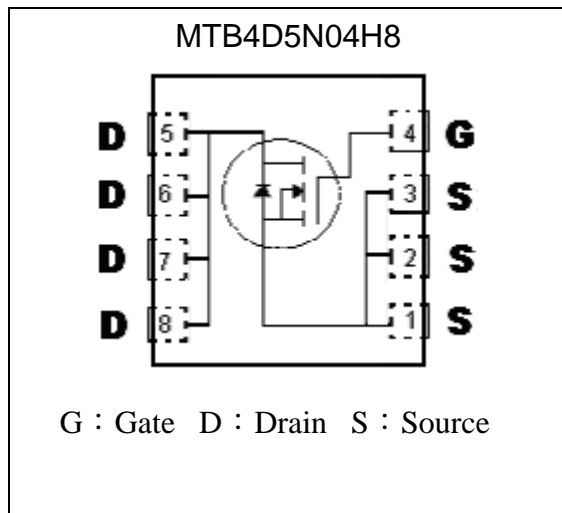
MTB4D5N04H8

BV_{DSS}	40V
I_D@V_{GS}=10V, T_C=25°C	74A(silicon limit)
I_D@V_{GS}=10V, T_A=25°C	16.5A
R_{DS(ON)} @ V_{GS}=10V, I_D=15A	3.7mΩ (typ.)

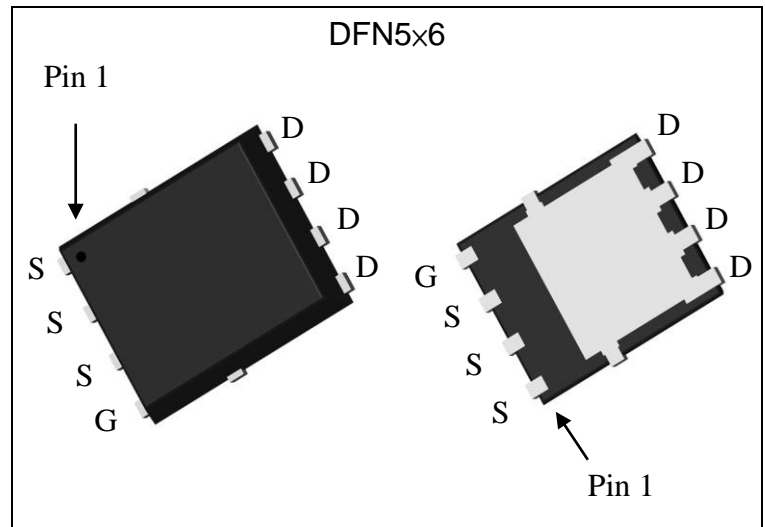
Features

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

Symbol

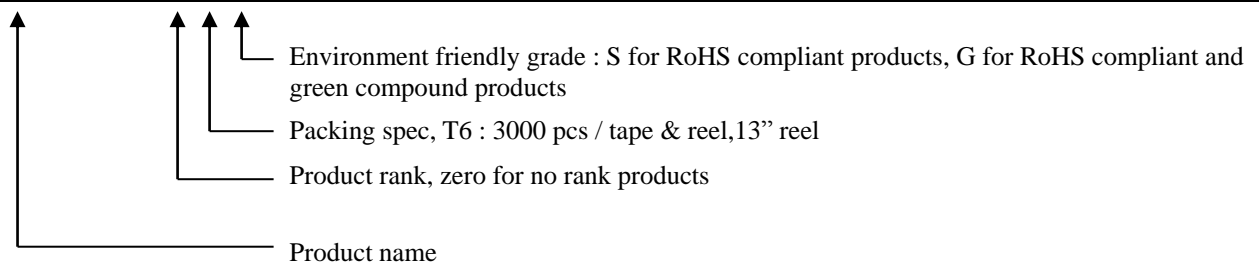


Outline



Ordering Information

Device	Package	Shipping
MTB4D5N04H8-0-T6-G	DFN 5 ×6 (Pb-free lead plating and halogen-free package)	3000 pcs / tape & reel





Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit	
Drain-Source Voltage	V _{DS}	40	V	
Gate-Source Voltage	V _{GS}	±20		
Continuous Drain Current @ T _C =25°C, V _{GS} =10V (silicon limit)	I _D	74	A	
Continuous Drain Current @ T _C =25°C, V _{GS} =10V (package limit)		60		
Continuous Drain Current @ T _C =100°C, V _{GS} =10V		46.8		
Continuous Drain Current @ T _A =25°C, V _{GS} =10V	I _{DSM}	16.5 *3		
Continuous Drain Current @ T _A =70°C, V _{GS} =10V		13.2 *3		
Pulsed Drain Current	I _{DM}	296 *1, 2		
Avalanche Current @ L=0.1mH	I _{AS}	60		
Avalanche Energy @ L=1mH, I _D =26A, V _{DD} =15V	E _{AS}	338	mJ	
Total Power Dissipation	P _D	T _C =25°C	50	W
		T _C =100°C	20	
	P _{DSM}	T _A =25°C	2.5 *3	
		T _A =70°C	1.6 *3	
Operating Junction and Storage Temperature Range	T _j , T _{stg}	-55~+150	°C	

100% UIS testing in conditions of V_D=15V, L=0.1mH, V_G=10V, I_L=20A, Rated V_{DS}=40V N-CH

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	R _{θJC}	2.5	°C/W
Thermal Resistance, Junction-to-ambient, max	R _{θJA}	50 *3	

Note : 1.Pulse width limited by maximum junction temperature.

2.Duty cycle≤1%.

3.Surface mounted on 1in2 copper pad of FR-4 board, t≤10s; 125 °C/W when mounted on minimum copper pad.

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	40	-	-	V	V _{GS} =0V, I _D =250μA
V _{GS(th)}	1	-	2.5		V _{DS} = V _{GS} , I _D =250μA
G _{FS} *1	-	24	-	S	V _{DS} =10V, I _D =10A
I _{GSS}	-	-	±100	nA	V _{GS} =±20V, V _{DS} =0V
I _{DSS}	-	-	1	μA	V _{DS} =32V, V _{GS} =0V
	-	-	5		V _{DS} =32V, V _{GS} =0V, T _j =55°C
R _{DS(ON)} *1	-	3.7	5.8	mΩ	V _{GS} =10V, I _D =15A
	-	4.8	8.8		V _{GS} =4.5V, I _D =10A

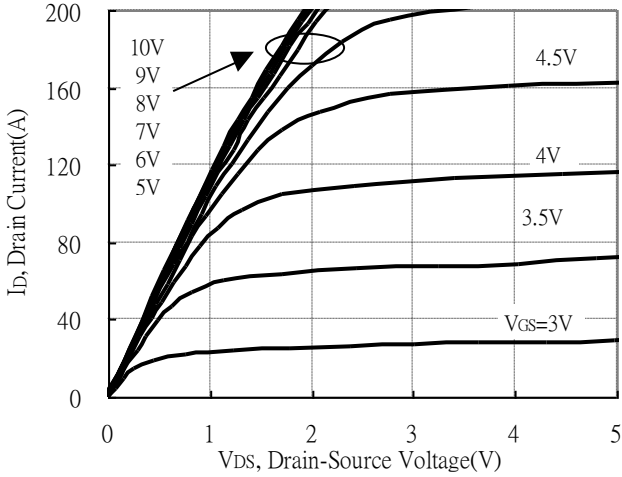


Dynamic					
Ciss	-	2393	-	pF	V _{DS} =20V, V _{GS} =0V, f=1MHz
Coss	-	253	-		
Crss	-	151	-		
Qg(V _{GS} =10V) *1, 2	-	46.2	70	nC	V _{DS} =20V, V _{GS} =10V, I _D =10A
Qg(V _{GS} =4.5V) *1, 2	-	22.8	35		
Qgs *1, 2	-	6.7	-		
Qgd *1, 2	-	8.9	-		
td(ON) *1, 2	-	16.4	-	ns	V _{DD} =20V, I _D =10A, V _{GS} =10V, R _{GS} =1 Ω
tr *1, 2	-	16.6	-		
td(OFF) *1, 2	-	61.8	-		
tf *1, 2	-	14.8	-		
Rg	-	0.9	-	Ω	f=1MHz
Source-Drain Diode					
I _S *1	-	-	40	A	
I _{SM} *3	-	-	160		
V _{SD} *1	-	0.73	1.1	V	I _S =3A, V _{GS} =0V
trr	-	16.3	-	ns	I _F =5A, dI _F /dt=100A/μs
Qrr	-	9.5	-	nC	

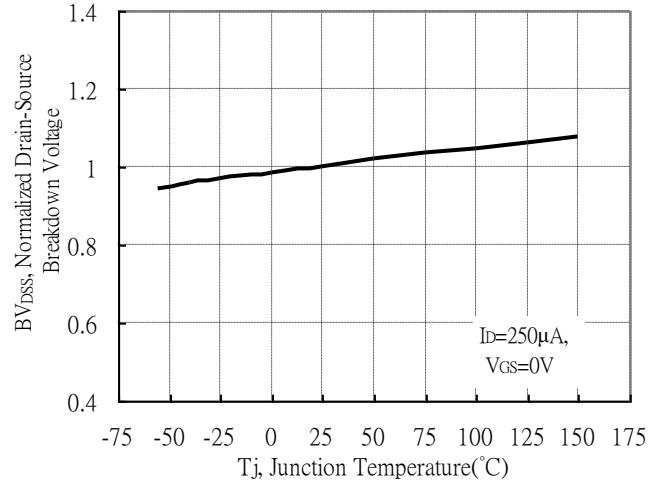
Note : *1.Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%
 *2.Independent of operating temperature
 *3.Pulse width limited by maximum junction temperature.

Typical Characteristics

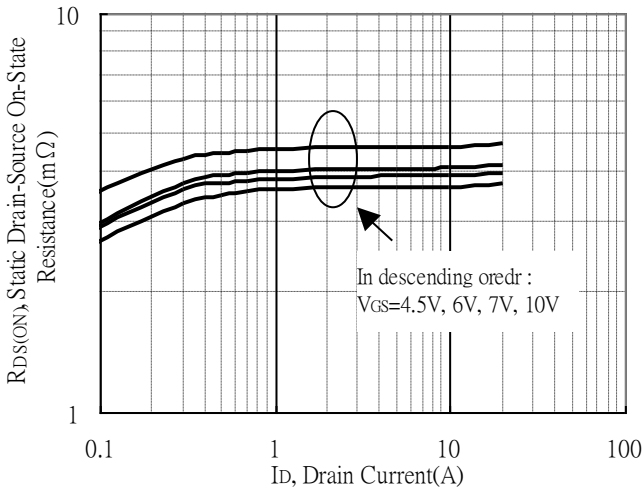
Typical Output Characteristics



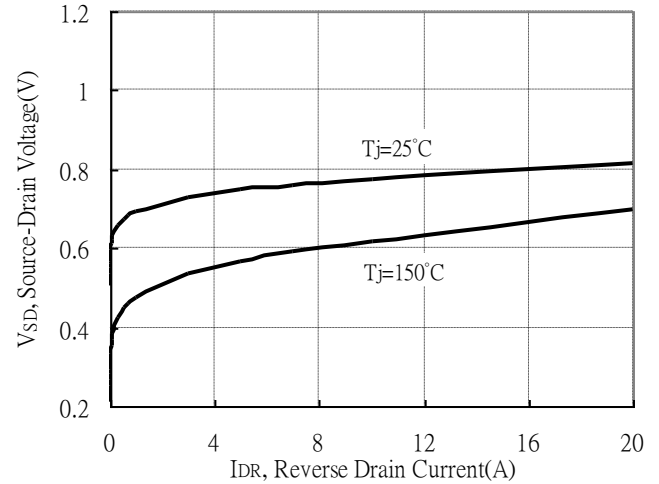
Brekdown Voltage vs Ambient Temperature



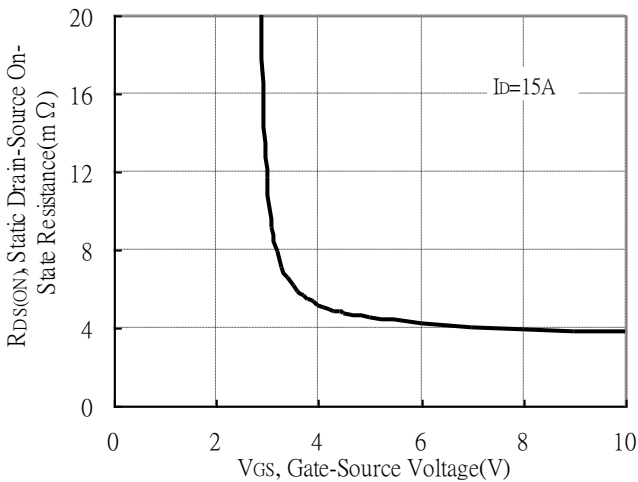
Static Drain-Source On-State resistance vs Drain Current



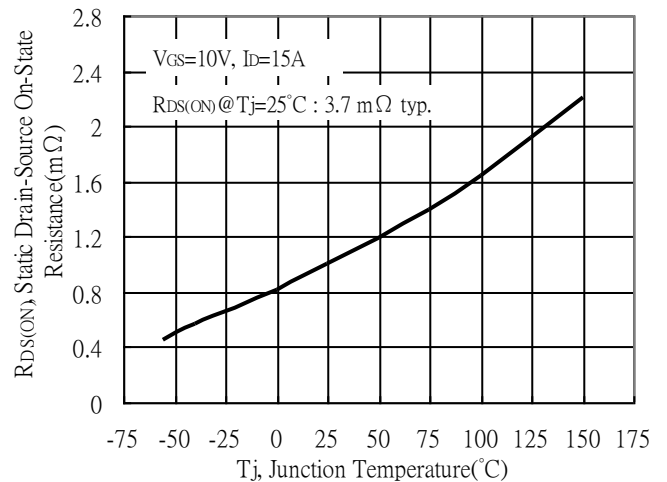
Reverse Drain Current vs Source-Drain Voltage



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



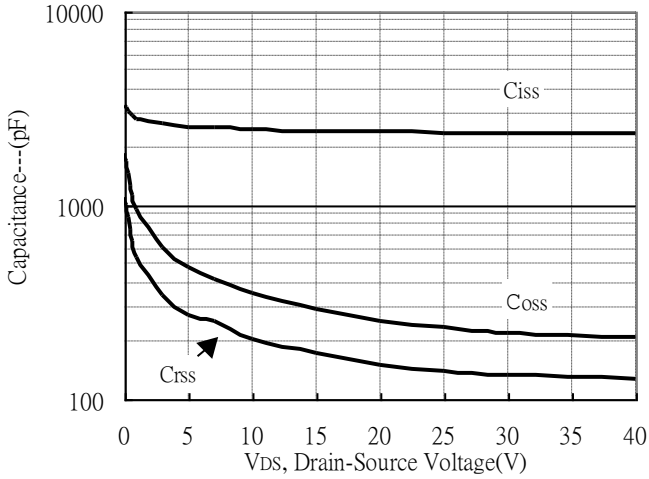
Drain-Source On-State Resistance vs Junction Temperature



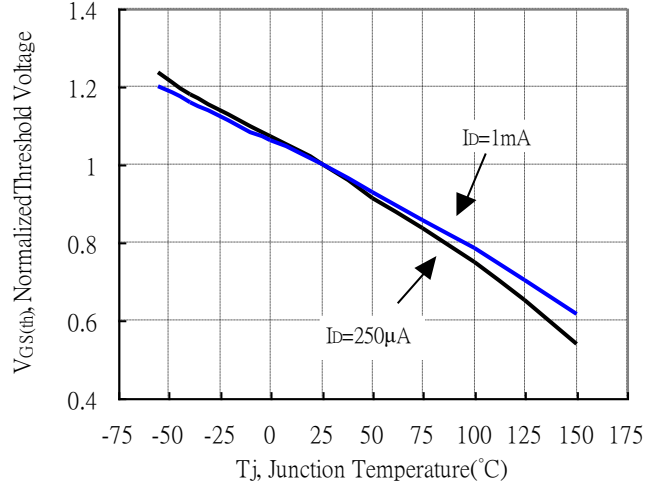


Typical Characteristics(Cont.)

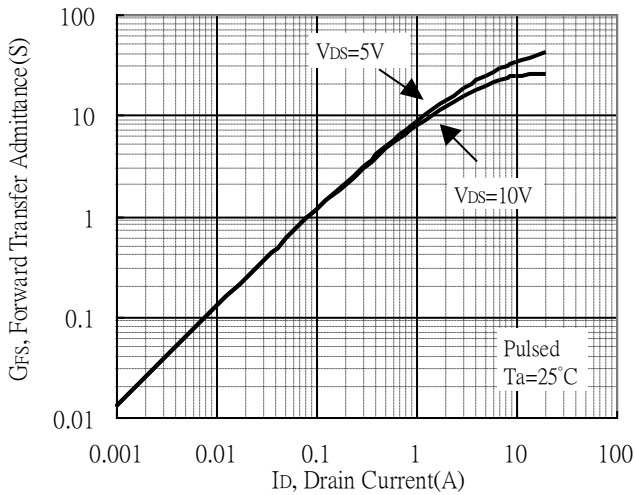
Capacitance vs Drain-to-Source Voltage



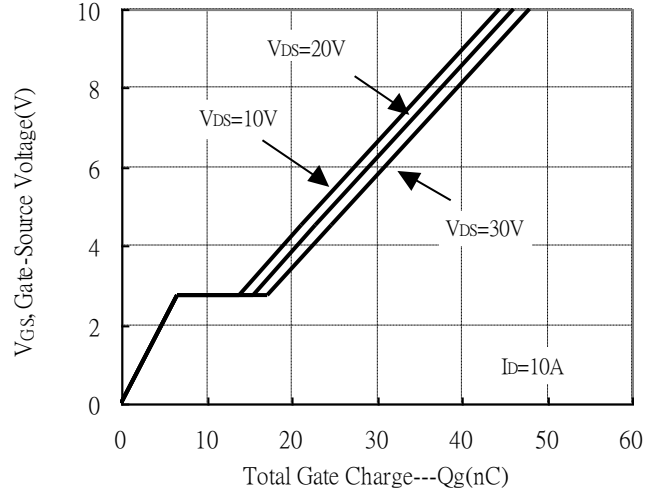
Threshold Voltage vs Junction Temperature



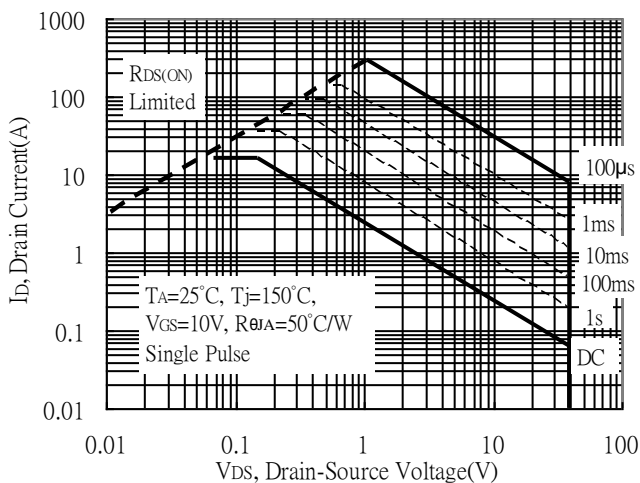
Forward Transfer Admittance vs Drain Current



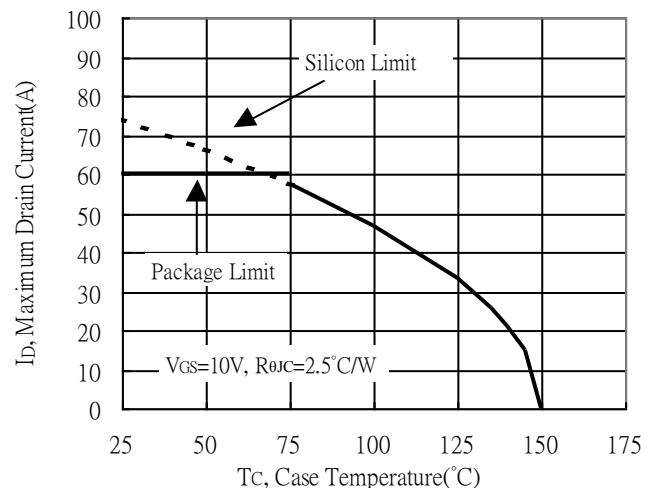
Gate Charge Characteristics



Maximum Safe Operating Area

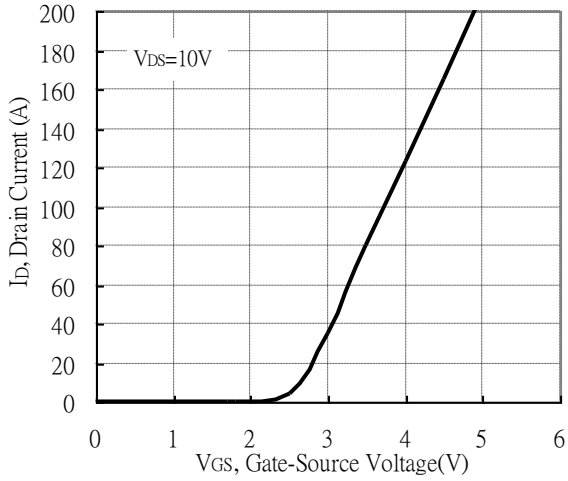


Maximum Drain Current vs Case Temperature

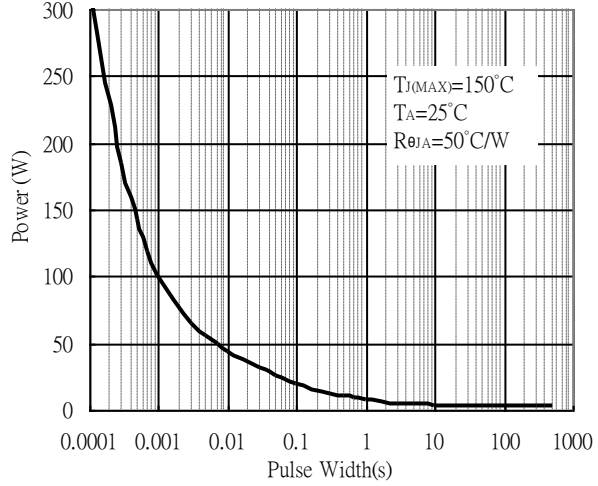


Typical Characteristics(Cont.)

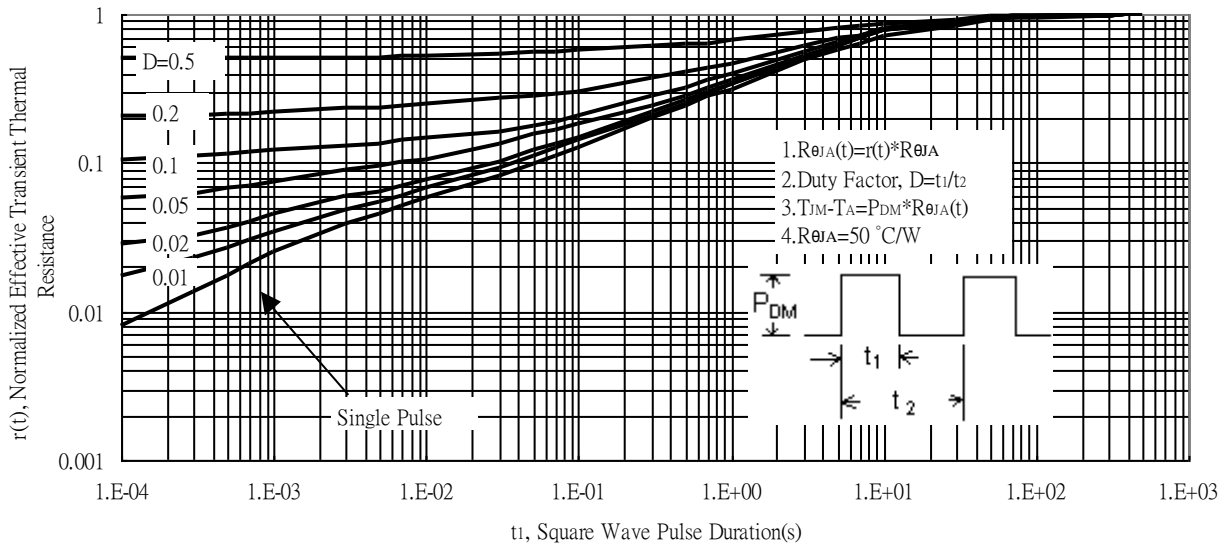
Typical Transfer Characteristics



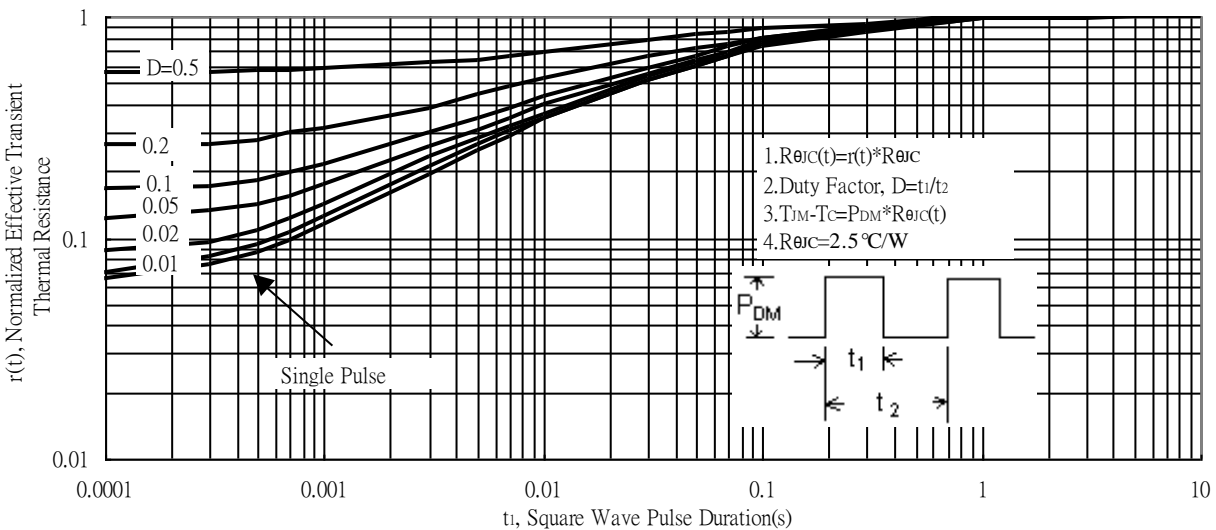
Single Pulse Power Rating, Junction to Ambient
 (Note on page 2)



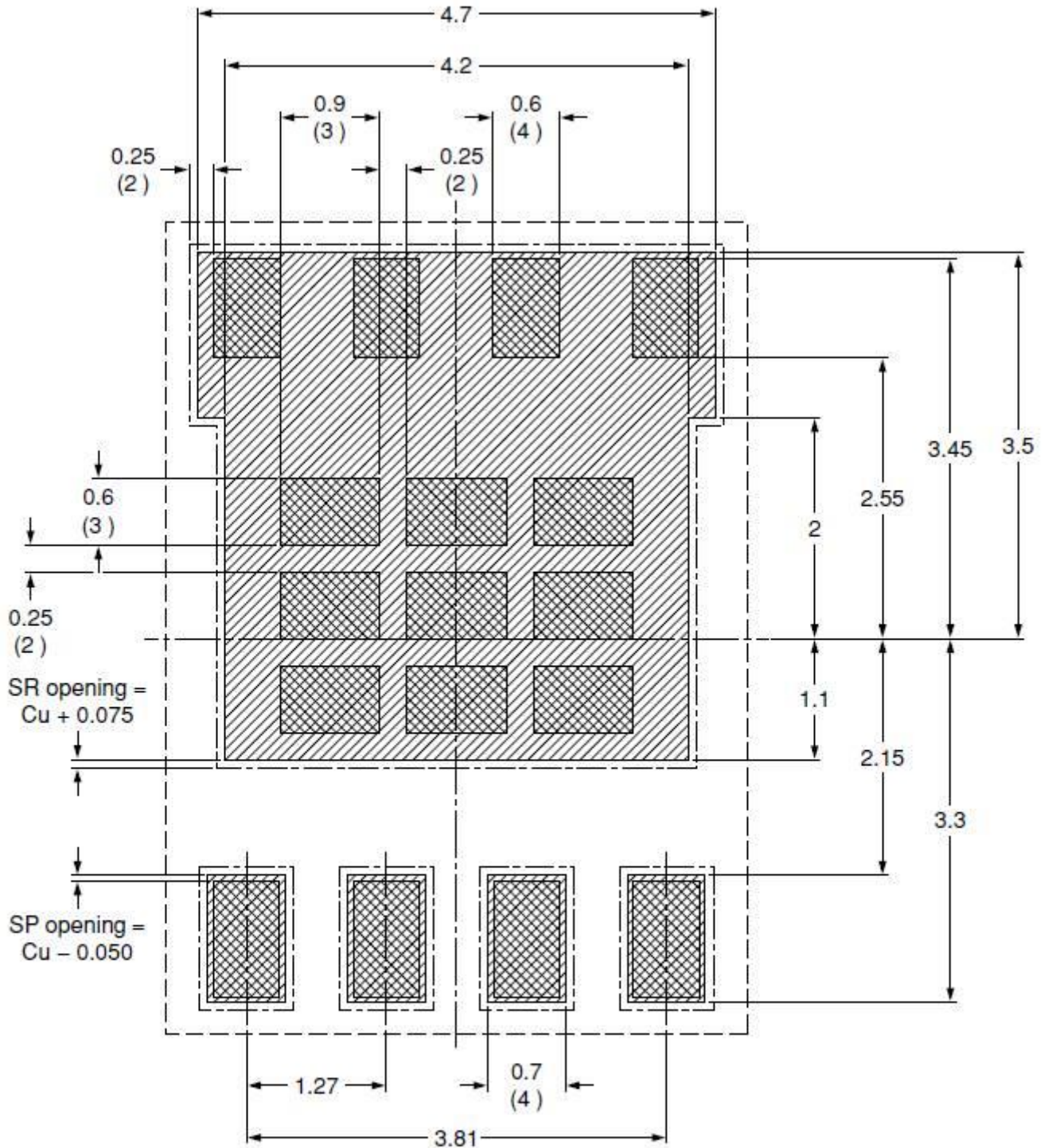
Transient Thermal Response Curves



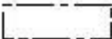



Transient Thermal Response Curves



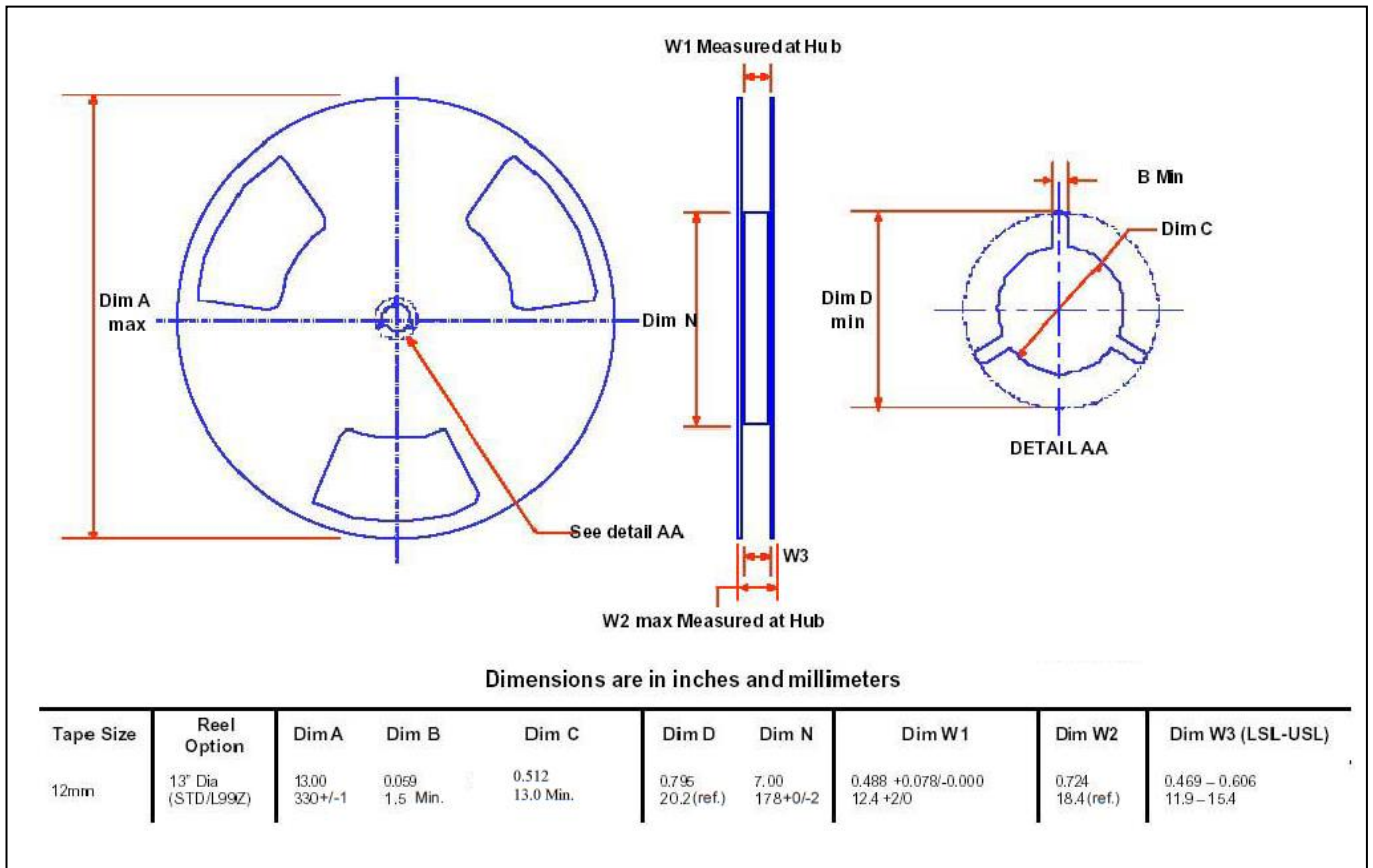
Recommended Soldering Footprint & Stencil Design



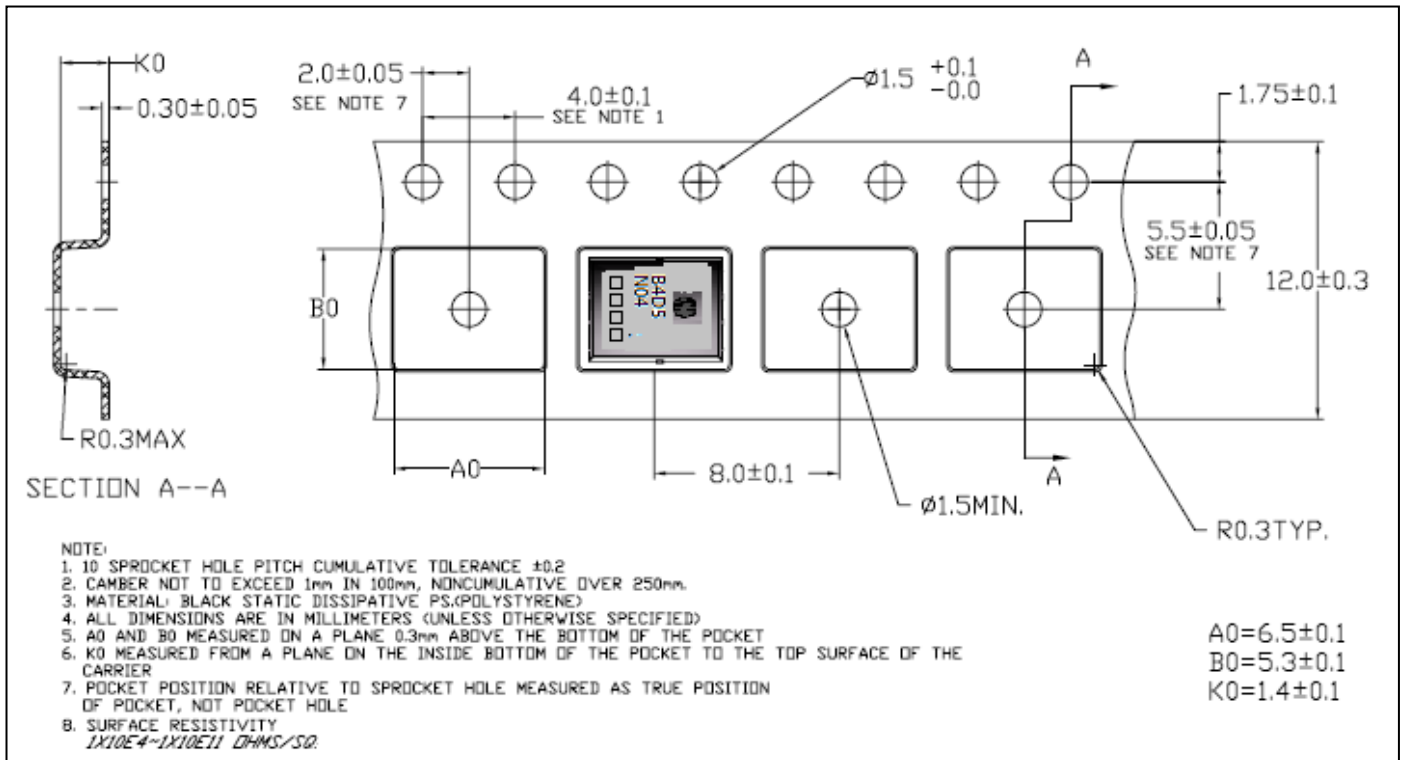
- | | |
|---|---|
|  solder lands |  solder paste
125 μ m stencil |
|  solder resist |  occupied area |

unit : mm

Reel Dimension



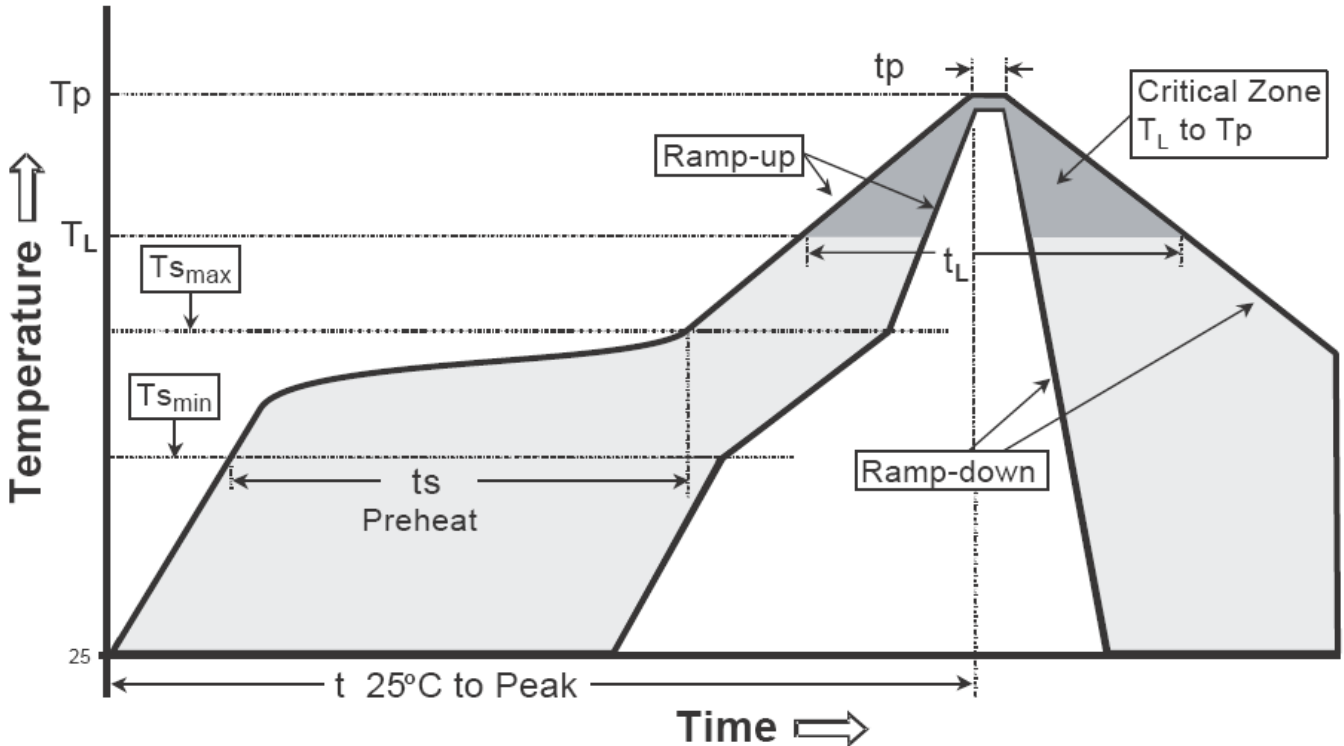
Carrier Tape Dimension



Recommended wave soldering condition

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

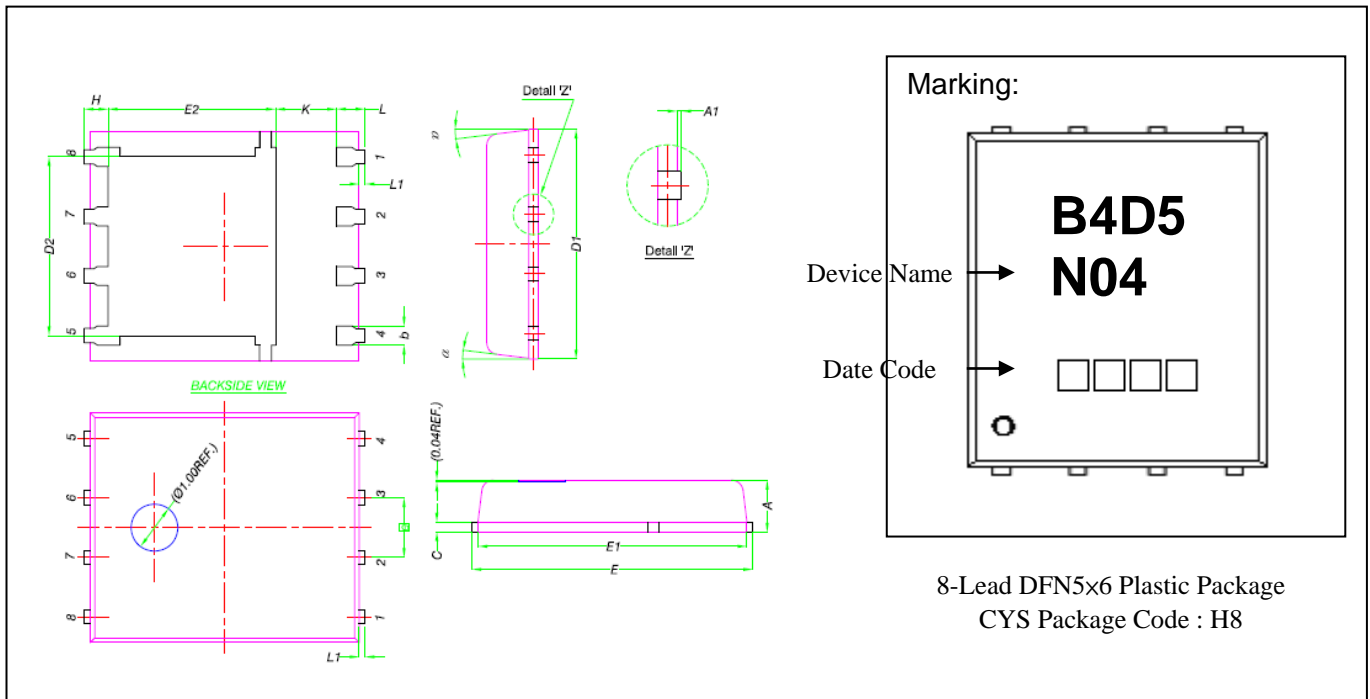
Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T _{smax} to T _p)	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T _{s min})	100°C	150°C
-Temperature Max(T _{s max})	150°C	200°C
-Time(t _{s min} to t _{s max})	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (T _L)	183°C	217°C
- Time (t _L)	60-150 seconds	60-150 seconds
Peak Temperature(T _p)	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(t _p)	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 : All temperatures refer to topside of the package, measured on the package body surface.

DFN5x6 Dimension



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.

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