N-Channel Enhancement Mode Power MOSFET

MTB1D0N03RH8

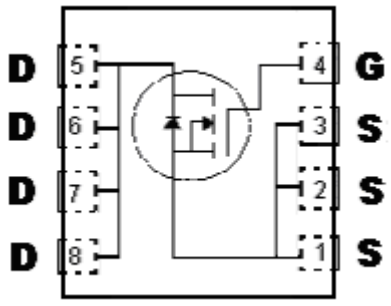
BV_{DSS}		30V
I_D@V_{GS}=10V, T_C=25°C(silicon limit)		200A
I_D@V_{GS}=10V, T_C=25°C(package limit)		84A
I_D@V_{GS}=10V, T_A=25°C		34.5A
$R_{DSON(TYP)}$	V_{GS}=10V, I_D=20A	0.7mΩ
	V_{GS}=4.5V, I_D=20A	1.3mΩ

Features

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

Symbol

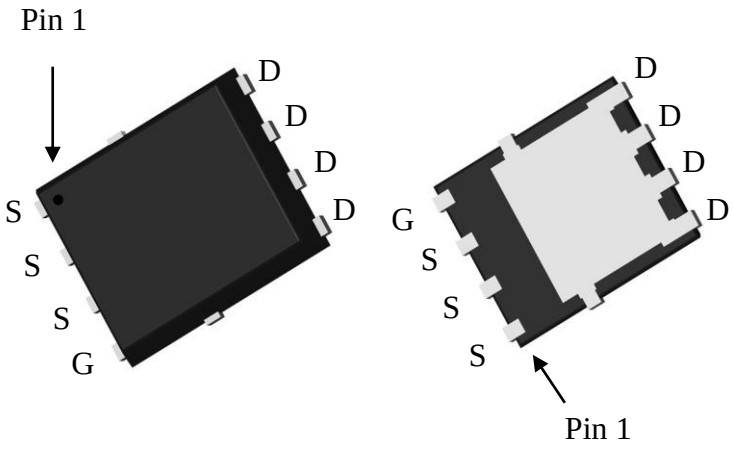
MTB1D0N03RH8



G：Gate D：Drain S：Source

Outline

DFN5x6



Ordering Information

Device	Package	Shipping
MTB1D0N03RH8-0-T6-G	DFN 5 x6 (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 (silicon limit) (Note 1)		I_D	200		A
Continuous Drain Current @ T_C=100°C, V_{GS}=10V (silicon limit) (Note 1)			126.5		
Continuous Drain Current @ T_C=25°C, V_{GS}=10V (package) (Note 1)			84		
Continuous Drain Current @ T_A=25°C, V_{GS}=10V (Note 2)		I_{DSM}	52	34.5	
Continuous Drain Current @ T_A=70°C, V_{GS}=10V (Note 2)			41.6	27.6	
Continuous Drain Current @ T_A=85°C, V_{GS}=10V (Note 2)			37.5	24.9	
Pulsed Drain Current (Note 3)		I_{DM}	588 *1		
Avalanche Current @ L=0.1mH (Note 3)		I_{AS}	108		
Avalanche Energy @ L=1mH, I_D=50A, V_{DD}=15V (Note 4)		E_{AS}	1250		mJ
Repetitive Avalanche Energy @ L=0.05mH (Note 3)		E_{AR}	8 *2		
Total Power Dissipation	T_C=25℃ (Note 1)	P_D	83		W
	T_C=100℃ (Note 1)		33		
	T_A=25°C (Note 2)	P_{DSM}	5.7	2.5	
	T_A=70°C (Note 2)		4.0	1.8	
	T_A=85°C (Note 2)		3.6	1.6	
Operating Junction and Storage Temperature Range		Tj, Tstg	-55~+150		°C

Thermal Data

Parameter		Symbol	Typical	Maximum	Unit
Thermal Resistance, Junction-to-ambient (Note 2)	t≤10s	$R_{\theta JA}$	18	22	°C/W
	Steady State		42	50	
Thermal Resistance, Junction-to-case		$R_{\theta JC}$	1.3	1.5	

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.Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C. Ratings are based on low frequency and low duty cycles to keep initial T_J=25°C.

4.100% tested by conditions of L=0.5mH, I_{AS}=12A, V_{GS}=10V, V_{DD}=15V

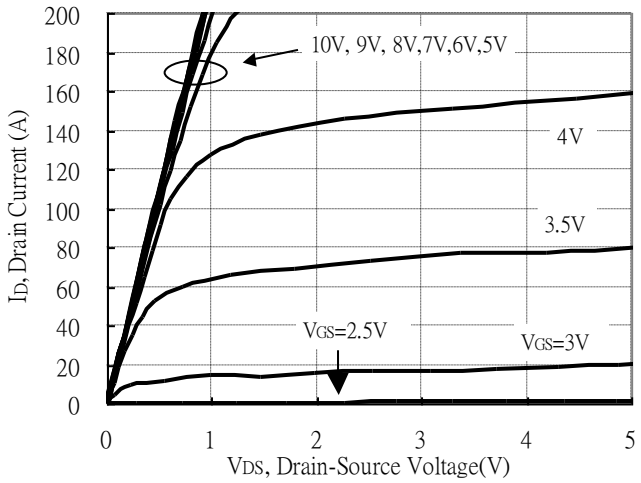
Characteristics (T_C=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	30	-	-	V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	1	-	2.5		V_{DS} = V_{GS}, I_D=250μA
G_{FS} *1	-	42.5	-	S	V_{DS} =10V, I_D=20A
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	1	μA	V_{DS} =24V, V_{GS} =0V
	-	-	25		V_{DS} =24V, V_{GS} =0V, Tj=125°C
$R_{DS(ON)}$ *1	-	0.7	1	mΩ	V_{GS} =10V, I_D=20A
	-	1.3	1.8		V_{GS} =4.5V, I_D=20A
Dynamic					
Ciss	-	6257		pF	V_{GS}=0V, V_{DS}=20V, f=1MHz
Coss	-	4552			
Crss	-	214			
Qg(V_{GS}=10V) *1, 2	-	108		nC	V_{DS}=20V, V_{GS}=10V, I_D=20A
Qg(V_{GS}=4.5V) *1, 2	-	54.6			
Qgs *1, 2	-	19.6	-		
Qgd *1, 2	-	20.9	-		
$t_{d(ON)}$ *1, 2	-	30.4		ns	V_{DD}=15V, I_D=20A, V_{GS}=10V, R_G=1Ω
tr *1, 2	-	20.6			
$t_{d(OFF)}$ *1, 2	-	84.8			
t_f *1, 2	-	14.2			
Rg	-	0.8	-	Ω	f=1MHz
Source-Drain Diode					
I_S *1	-	-	60	A	
I_{SM} *3	-	-	588		
V_{SD} *1	-	0.77	1.2	V	I_S=20A, V_{GS}=0V
trr	-	69.7		ns	I_F=20A, dI_F/dt=100A/μs
Qrr	-	82.1		nC	

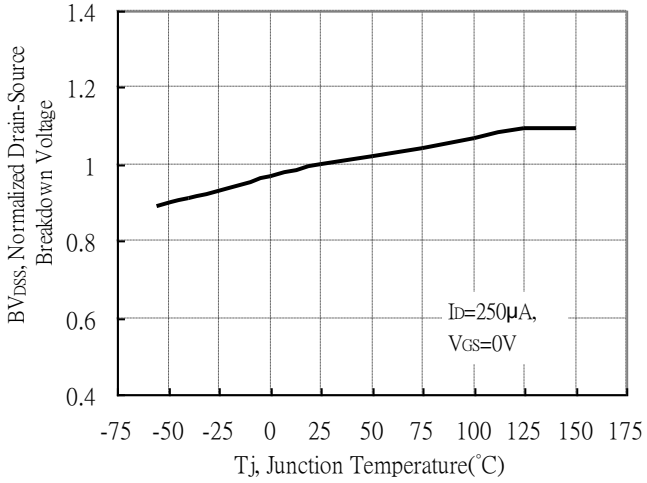
Note : *1.Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%
*2.Independent of operating temperature
*3.Pulse width limited by maximum junction temperature.

Typical Characteristics

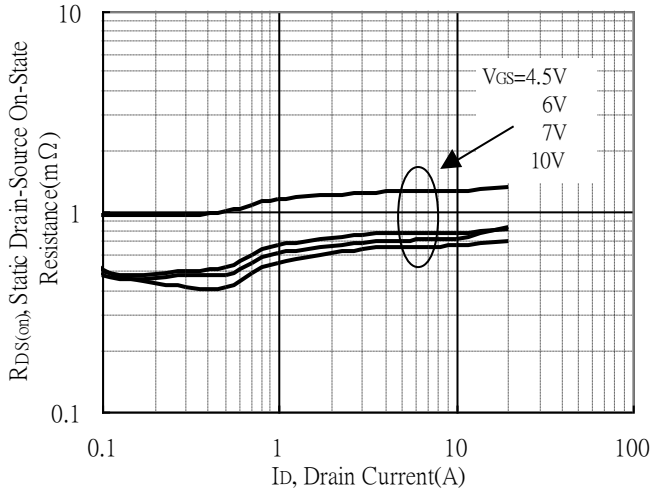
Typical Output Characteristics



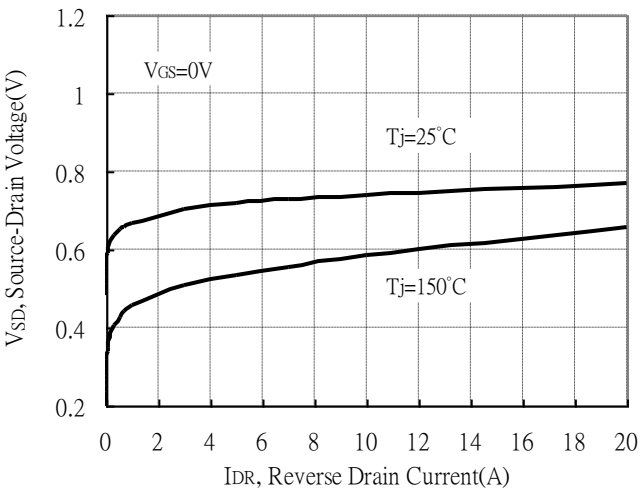
Brekdown Voltage vs Ambient Temperature



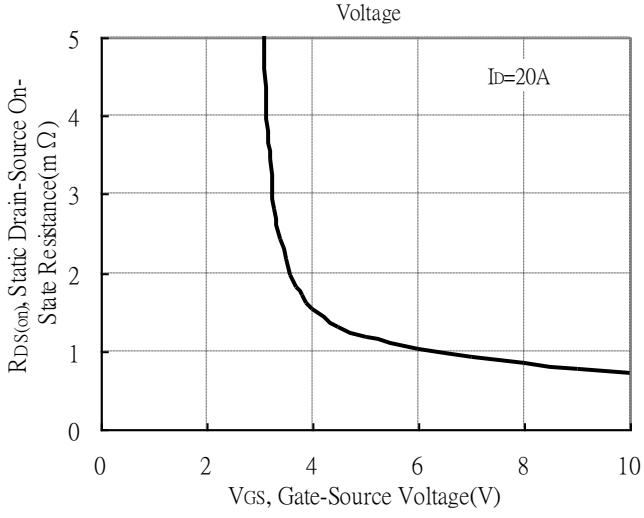
Static Drain-Source On-State resistance vs Drain Current



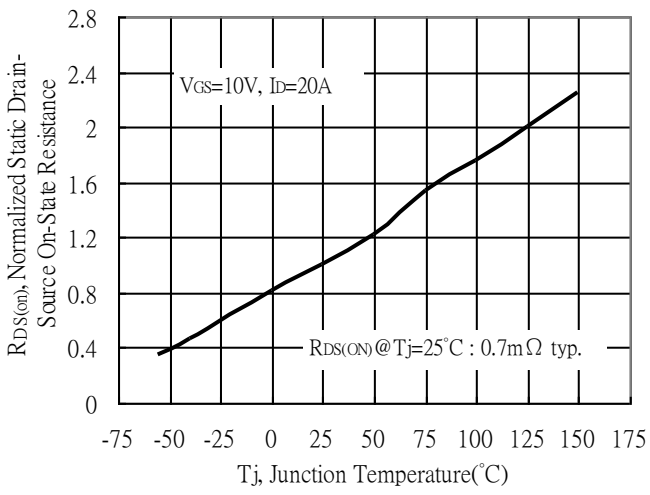
Reverse Drain Current vs Source-Drain Voltage



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

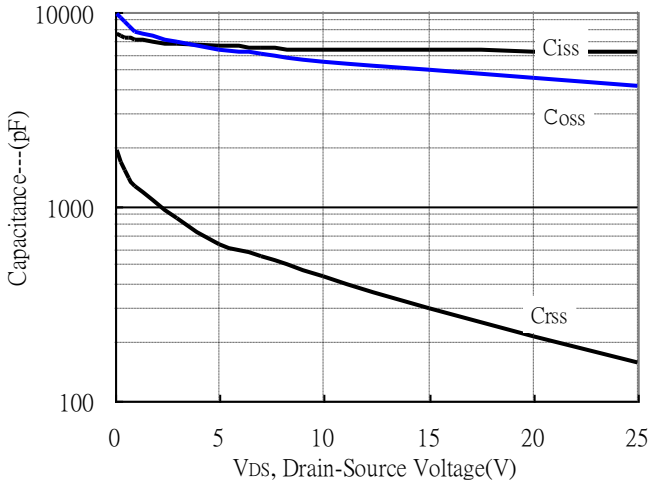


Drain-Source On-State Resistance vs Junction Tempearture

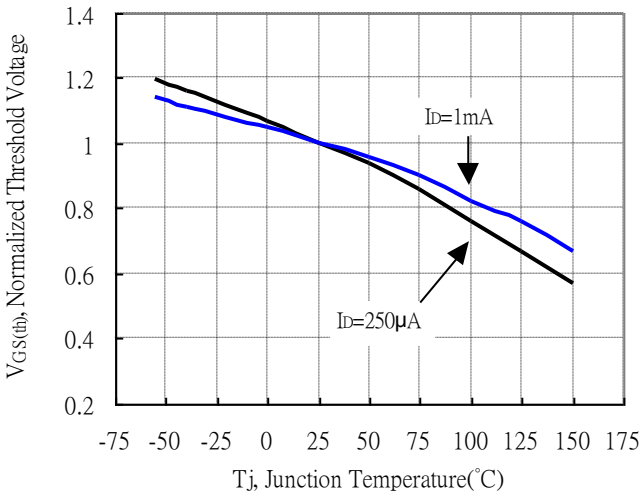


Typical Characteristics(Cont.)

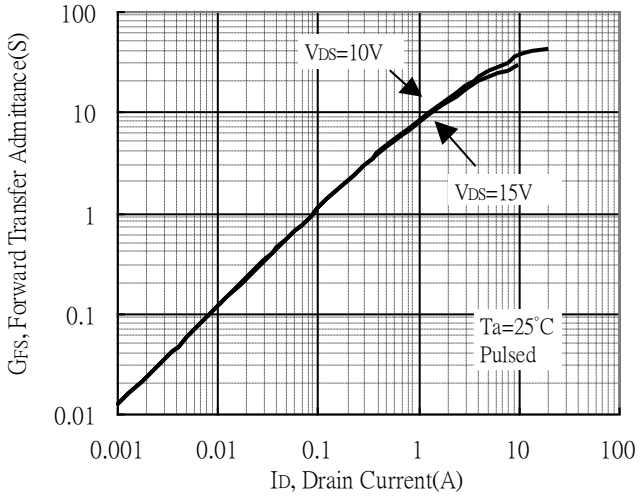
Capacitance vs Drain-to-Source Voltage



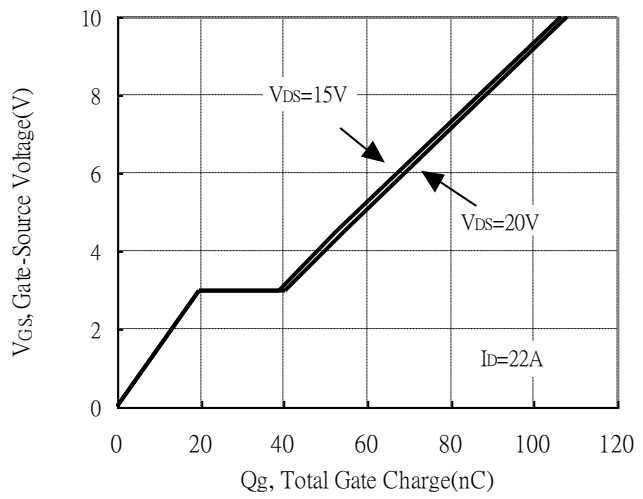
Threshold Voltage vs Junction Tempearture



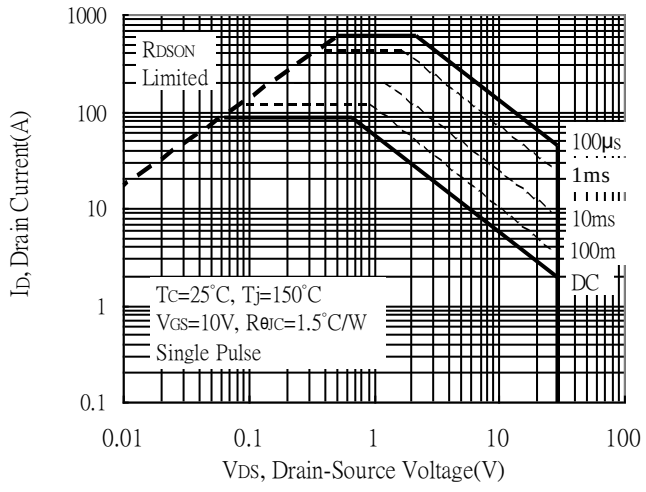
Forward Transfer Admittance vs Drain Current



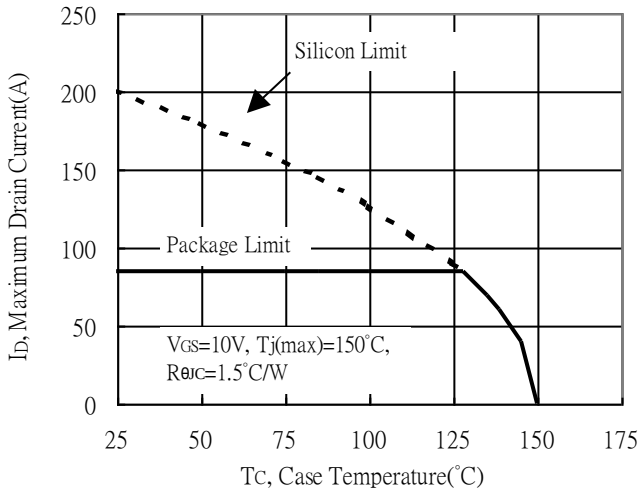
Gate Charge Characteristics



Maximum Safe Operating Area

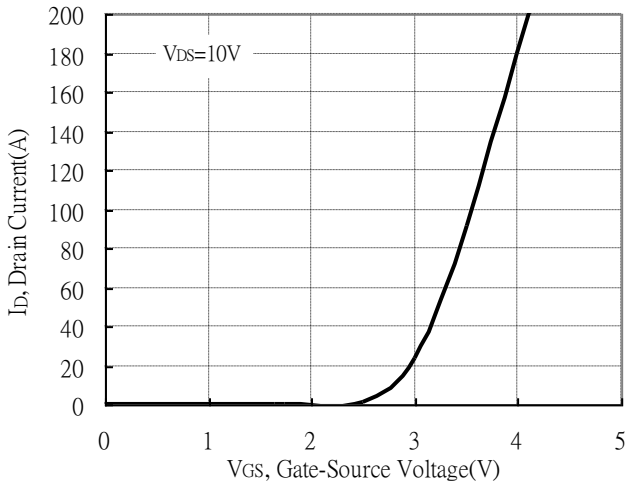


Maximum Drain Current vs Case Temperature

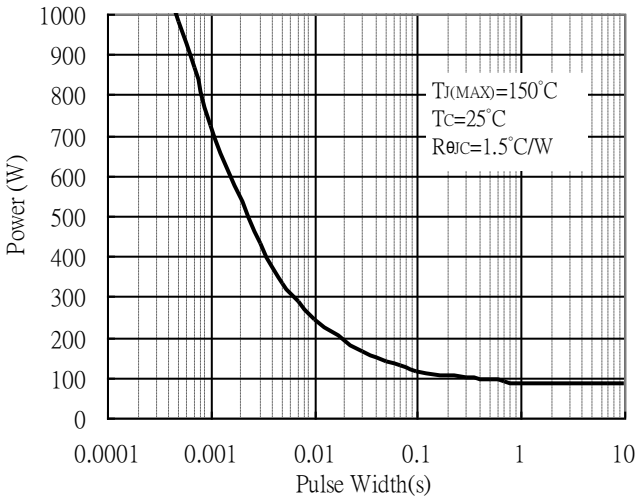


Typical Characteristics(Cont.)

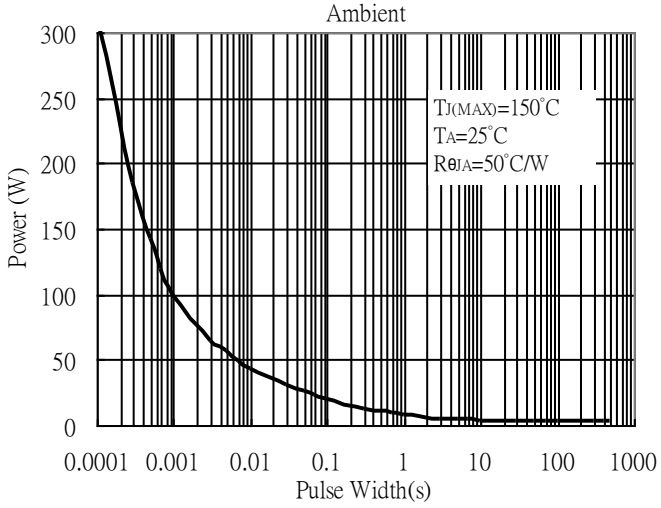
Typical Transfer Characteristics



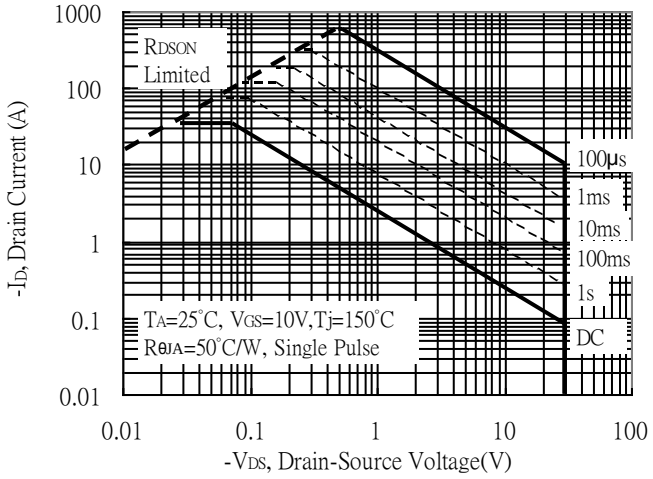
Single Pulse Power Rating, Junction to Case



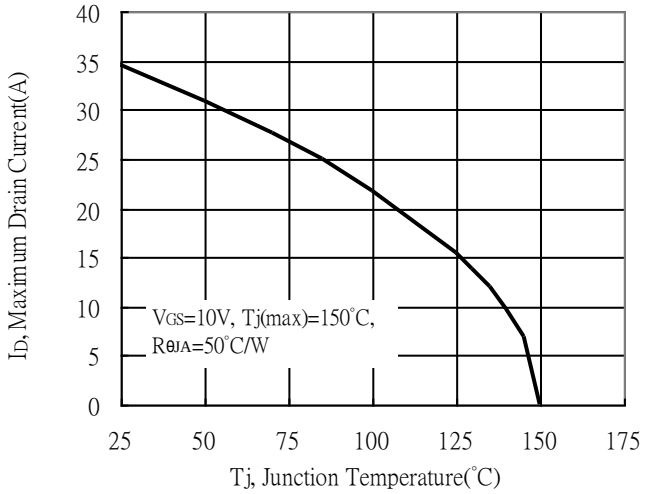
Single Pulse Maximum Power Dissipation, Nunction to Ambient



Maximum Safe Operating Area

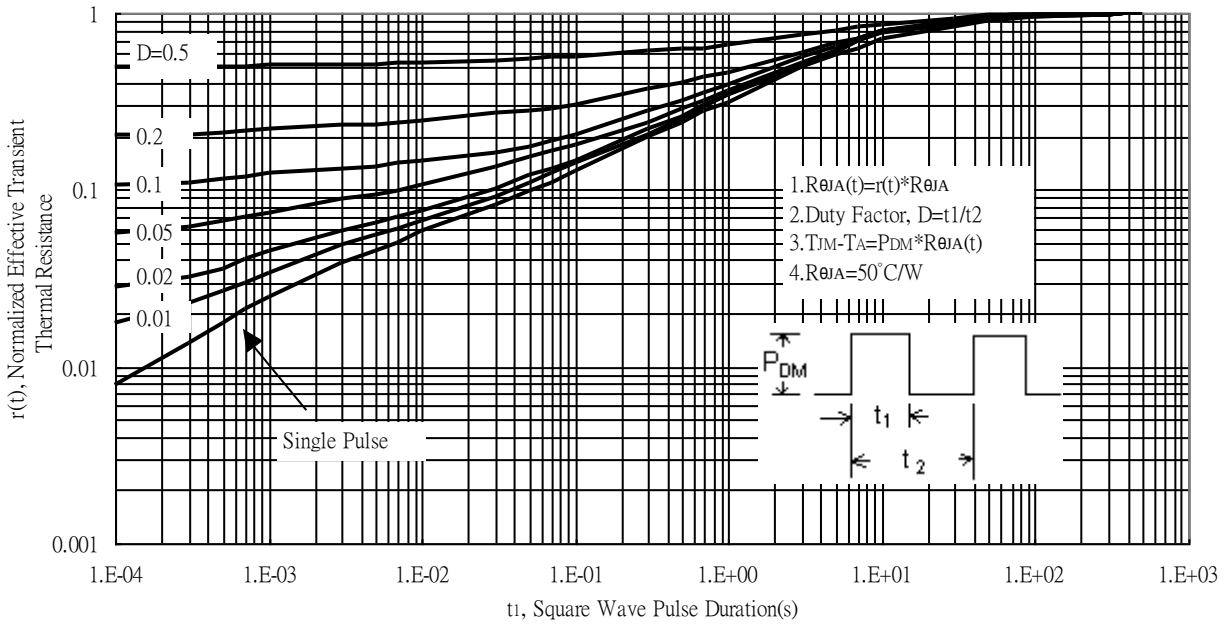


Maximum Drain Current vs Junction Temperature

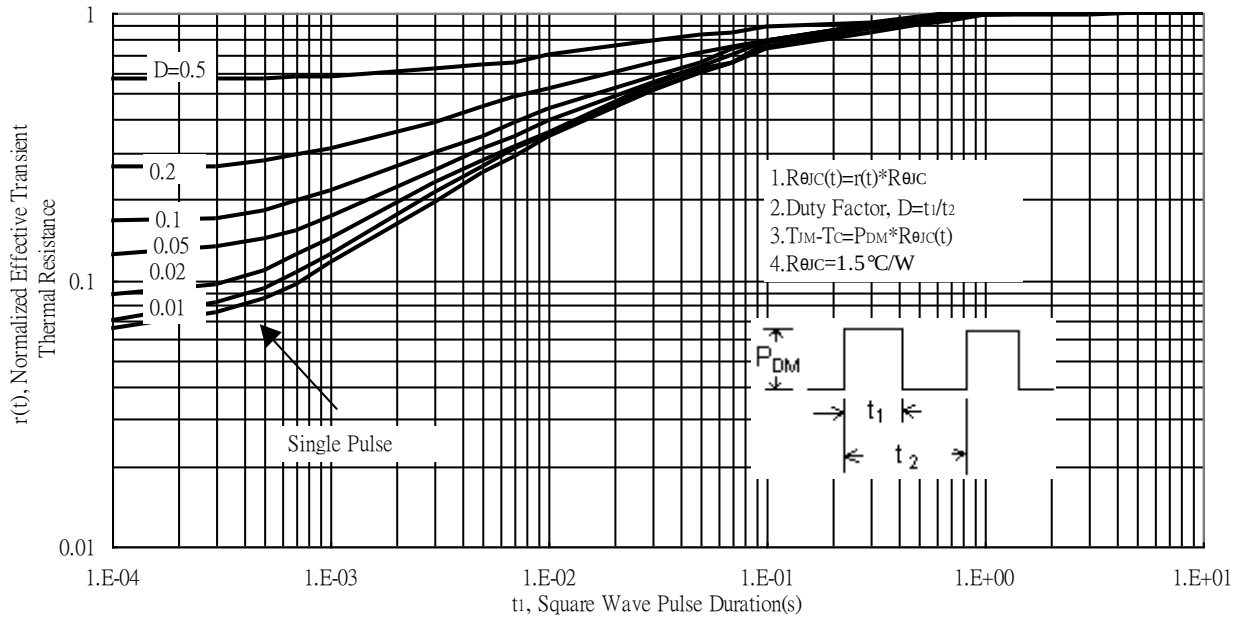


Typical Characteristics(Cont.)

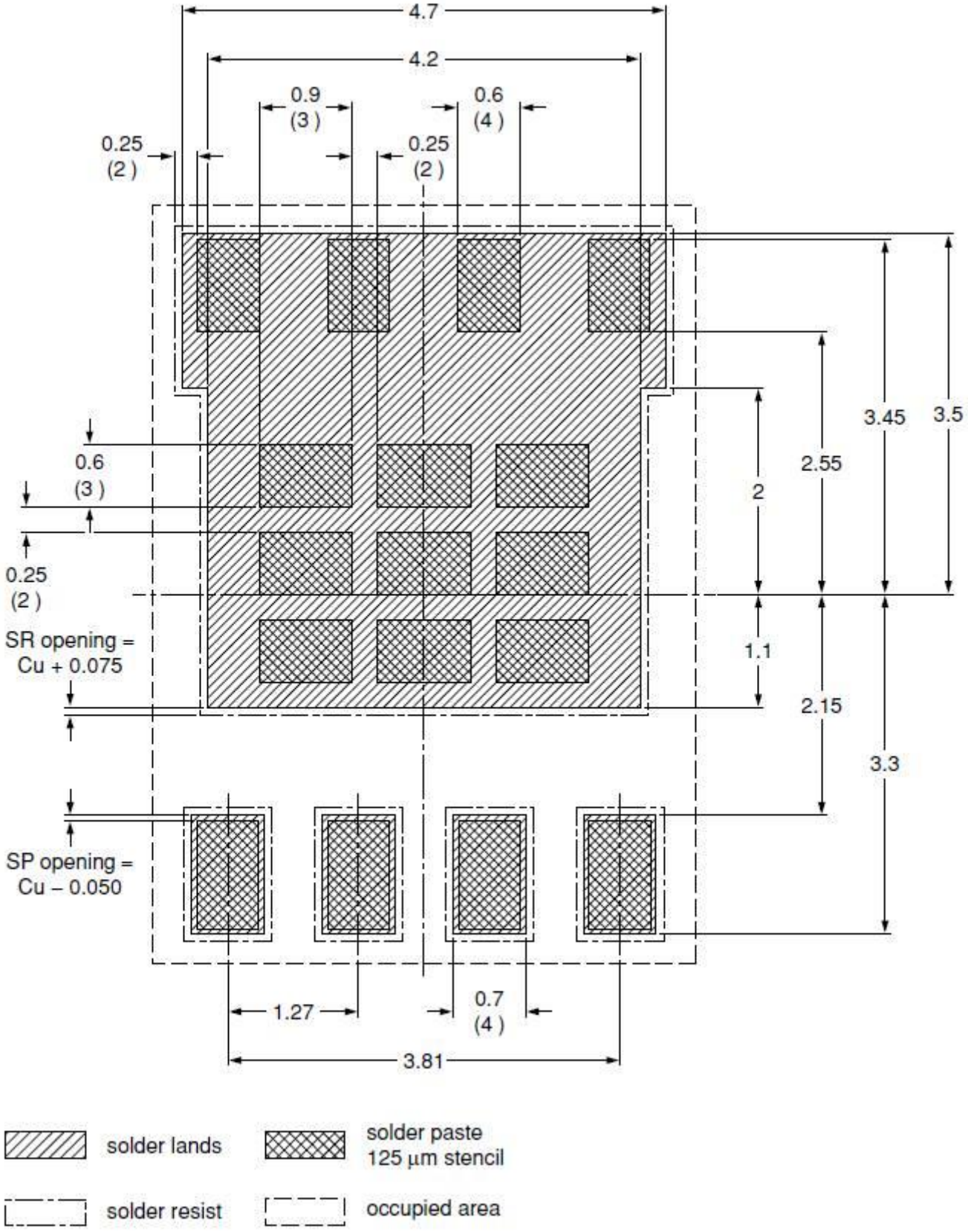
Transient Thermal Response Curves



Transient Thermal Response Curves

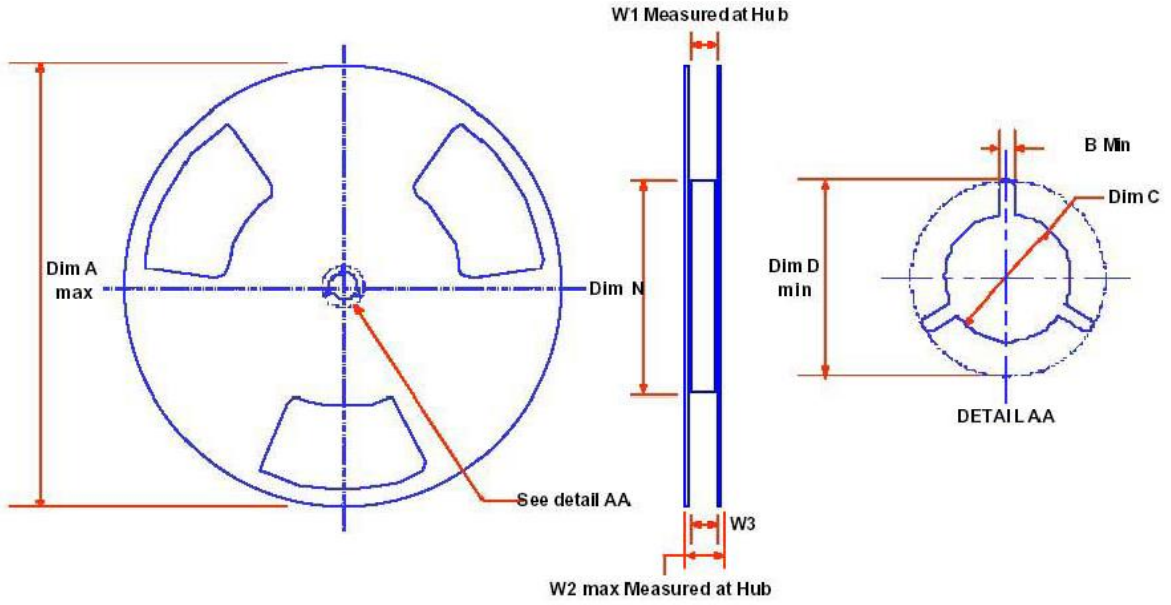


Recommended Soldering Footprint & Stencil Design



unit : mm

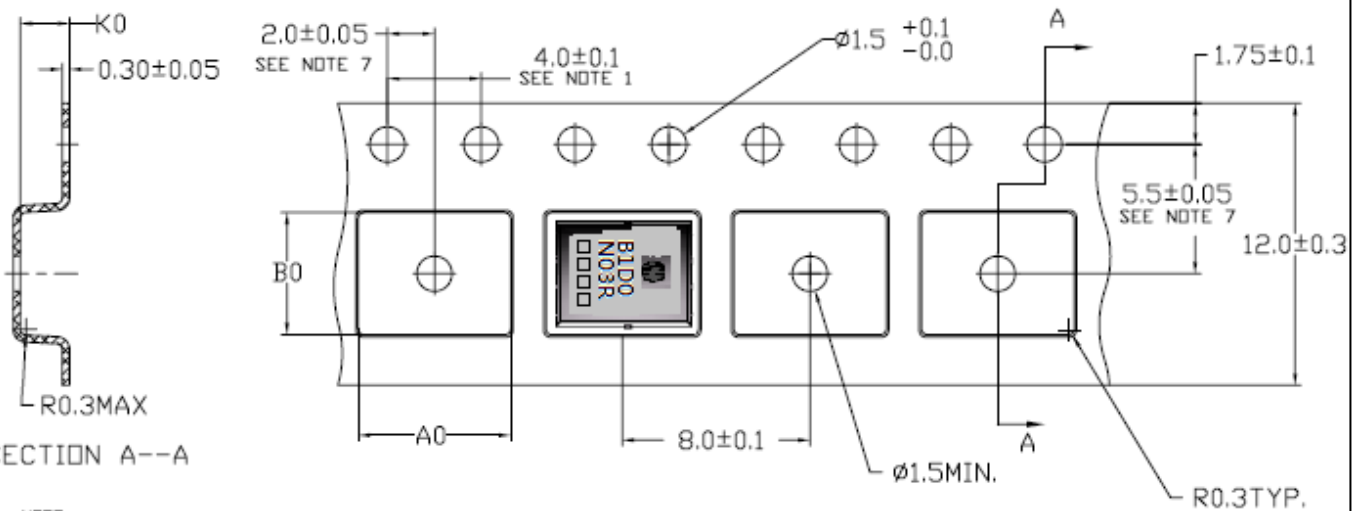
Reel Dimension



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



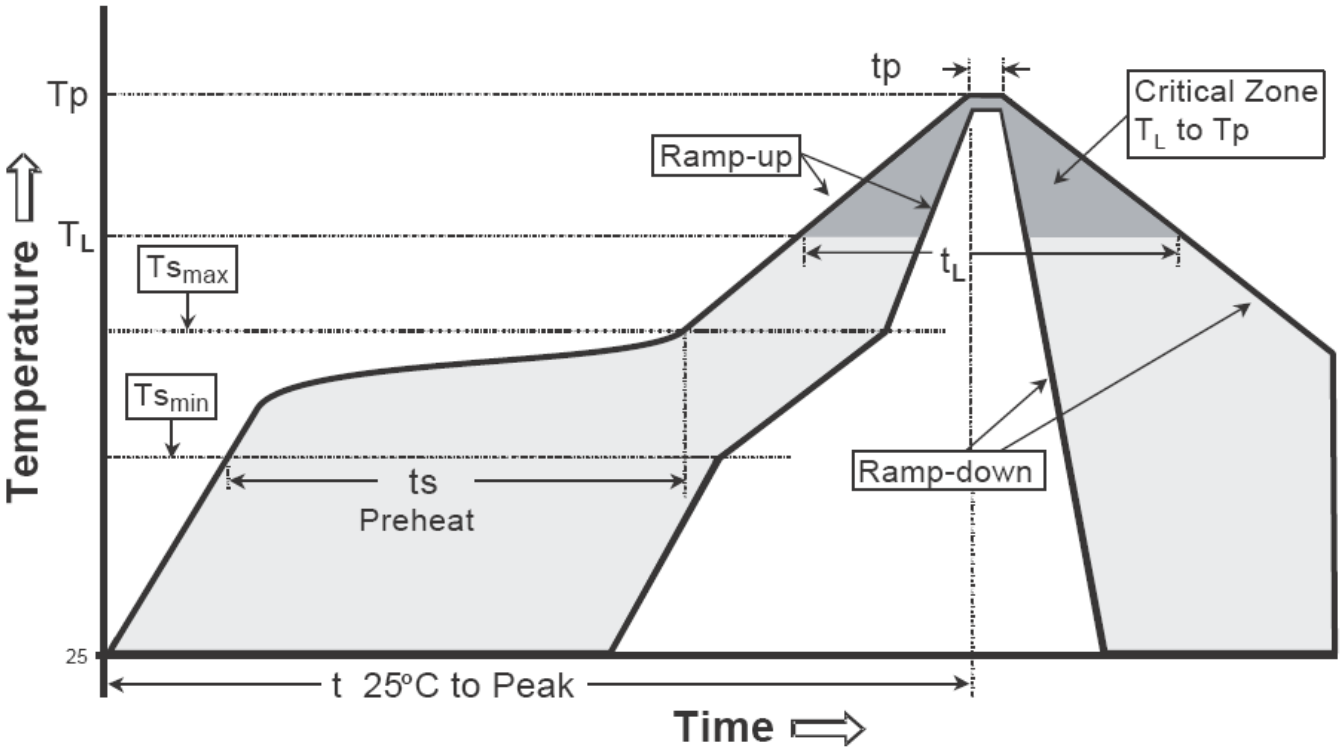
NOTE:
1. 10 SPROCKET HOLE PITCH CUMULATIVE TOLERANCE ±0.2
2. CAMBER NOT TO EXCEED 1mm IN 100mm, NONCUMULATIVE OVER 250mm.
3. MATERIAL: BLACK STATIC DISSIPATIVE PS.(POLYSTYRENE)
4. ALL DIMENSIONS ARE IN MILLIMETERS (UNLESS OTHERWISE SPECIFIED)
5. A0 AND B0 MEASURED ON A PLANE 0.3mm ABOVE THE BOTTOM OF 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.

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

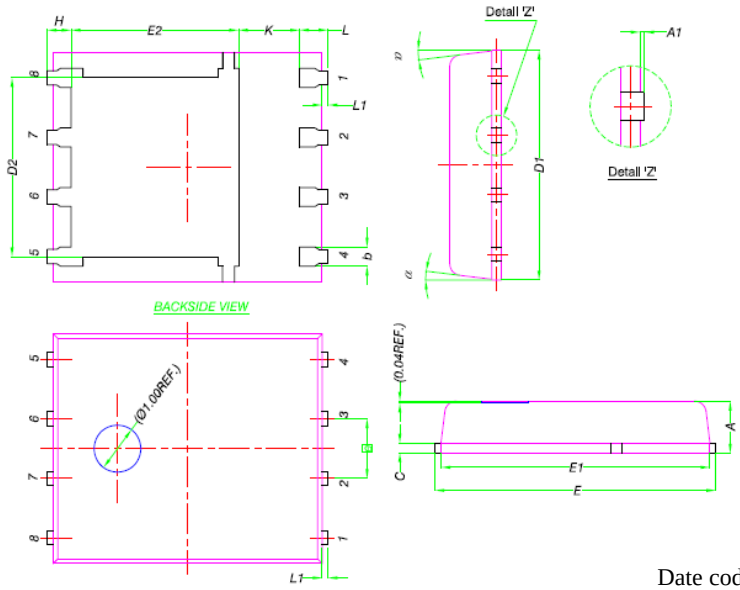
Recommended temperature profile for IR reflow



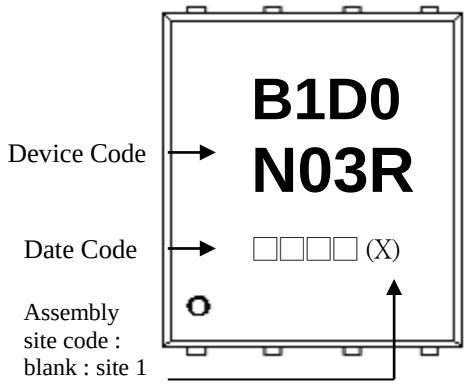
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(Ts min) −Temperature Max(Ts max) −Time(ts min to ts max)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (TL) − 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 : All temperatures refer to topside of the package, measured on the package body surface.

DFN5x6 Dimension



Marking:



8-Lead DFN5x6 Plastic Package
CYS Package Code : H8

Date code : (From left to right)
First code : Year code, the last digit of Christine year.
For example, 2017→7, 2018→8, 2019→9, …, etc.
Second code : Month code, Jan→A, Feb→B, Mar→C, Apr→D,
May→E, Jun→F, Jul→G, Aug→H, Sep→J, Oct→K,
Nov→L, Dec→M
Third and fourth codes : production serial number, 01~99

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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