

N-Channel Logic Level Enhancement Mode Power MOSFET

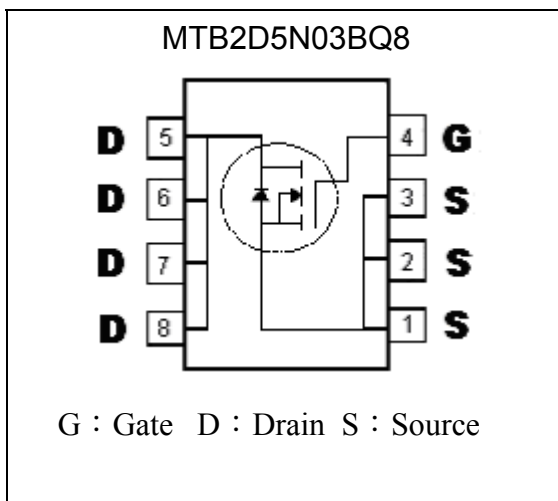
MTB2D5N03BQ8

BVDSS	30V
ID@ TA=25°C, VGS=10V	21A
ID@ TC=25°C, VGS=10V	30A
RDSON@VGS=10V, ID=19A	2.7mΩ (typ)
RDSON@VGS=4.5V, ID=15A	3.6mΩ (typ)

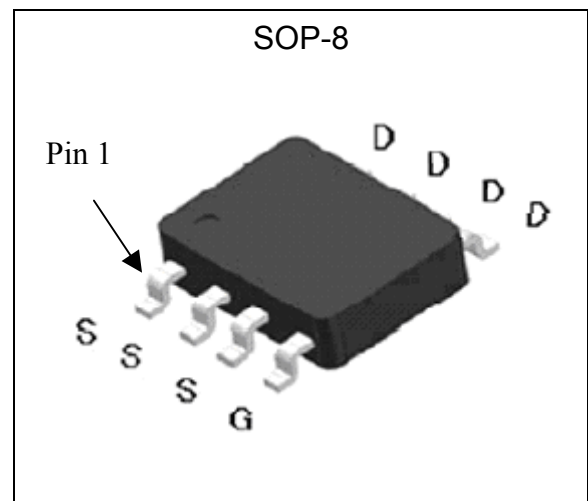
Features

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

Symbol

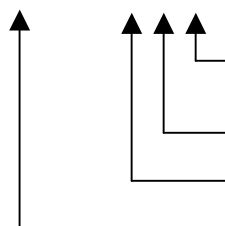


Outline



Ordering Information

Device	Package	Shipping
MTB2D5N03BQ8-0-T3-G	SOP-8 (Pb-free lead plating and halogen-free package)	2500 pcs / tape & reel



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

Packing spec, T3 : 2500 pcs / tape & reel, 13" reel

Product rank, zero for no rank products

Product name

**Absolute Maximum Ratings** (Ta=25°C)

Parameter		Symbol	Limits	Unit
Drain-Source Voltage		V _{DS}	30	V
Gate-Source Voltage		V _{GS}	±20	
Continuous Drain Current @ T _A =25°C, V _{GS} =10V		I _{DSM}	21	A
Continuous Drain Current @ T _A =70°C, V _{GS} =10V			16.8	
Continuous Drain Current @ T _C =25°C, V _{GS} =10V		I _D	30	
Continuous Drain Current @ T _C =100°C, V _{GS} =10V			19	
Pulsed Drain Current		I _{DM}	120 *1	
Avalanche Current		I _{AS}	30	
Avalanche Energy @ L=0.5mH, I _D =30A, V _{DD} =20V		E _{AS}	225 *3	mJ
Repetitive Avalanche Energy @ L=0.05mH		E _{AR}	0.6 *2	
Total Power Dissipation	T _A =25°C	P _{DSM}	3.1 *4	W
	T _A =70°C		2.0 *4	
	T _C =25°C	P _D	6.3	
	T _C =100°C		2.5	
Operating Junction and Storage Temperature Range		T _j , T _{stg}	-55~+150	°C

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	R _{th,j-c}	20	°C/W
Thermal Resistance, Junction-to-ambient, max	R _{th,j-a}	40 *4	

- Note : 1. Pulse width limited by maximum junction temperature.
2. Duty cycle ≤ 1%.
3. 100% tested by conditions of L=0.5mH, V_{GS}=10V, I_{AS}=19A, V_{DD}=20V.
4. Surface mounted on 1 in² copper pad of FR-4 board, t ≤ 10s; 125°C/W when mounted on minimum copper pad.

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)}	1.0	-	2.5		V _{DS} = V _{GS} , I _D =250μA
G _{FS} *1	-	23.6	-	S	V _{DS} = 10V, I _D =18A
I _{GSS}	-	-	±100	nA	V _{GS} =±20V
I _{DSS}	-	-	1	μA	V _{DS} = 30V, V _{GS} = 0V
	-	-	25		V _{DS} = 30V, V _{GS} = 0V, T _j =85°C
R _{DS(ON)} *1	-	2.7	3.4	mΩ	V _{GS} = 10V, I _D =19A
	-	3.6	4.7		V _{GS} = 4.5V, I _D =15A



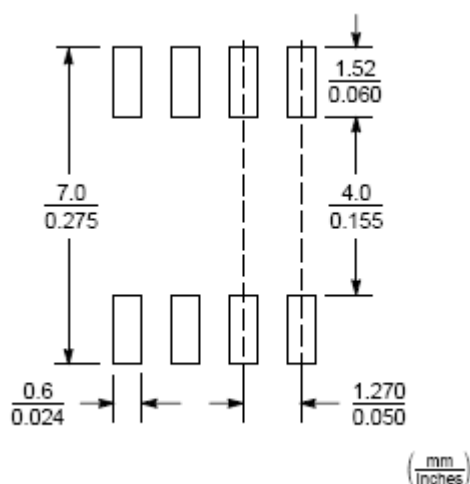
Dynamic					
Ciss	-	2633	-	pF	V _{GS} =0V, V _{DS} =15V, f=1MHz
Coss	-	471	-		
Crss	-	279	-		
Qg (V _{GS} =10V) *1, 2	-	54	-	nC	V _{DS} =15V, V _{GS} =10V, I _D =20A
Qg (V _{GS} =4.5V) *1, 2	-	27.5	-		
Qgs *1, 2	-	9.1	-		
Qgd *1, 2	-	11.6	-		
t _{d(ON)} *1, 2	-	18	-	ns	V _{DS} =15V, I _D =20A, V _{GS} =10V, R _{GS} =3Ω
t _r *1, 2	-	21	-		
t _{d(OFF)} *1, 2	-	63.4	-		
t _f *1, 2	-	15.2	-		
R _g	-	1.5	-	Ω	f=1MHz
Source-Drain Diode					
I _S *1	-	-	9	A	
I _{SM} *3	-	-	36		
V _{SD} *1	-	0.69	1	V	I _S =1A, V _{GS} =0V
t _{rr}	-	15.4	-	ns	I _F =20A, dI _F /dt=100A/μs
Q _{rr}	-	6.7	-	nC	

Note : *1.Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

*2.Independent of operating temperature

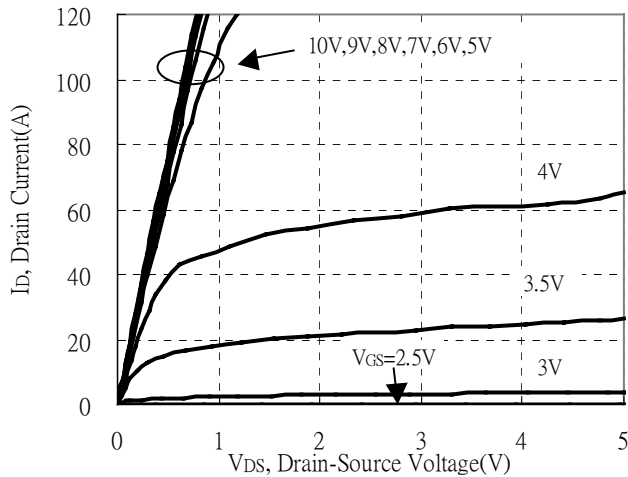
*3.Pulse width limited by maximum junction temperature.

Recommended Soldering Footprint

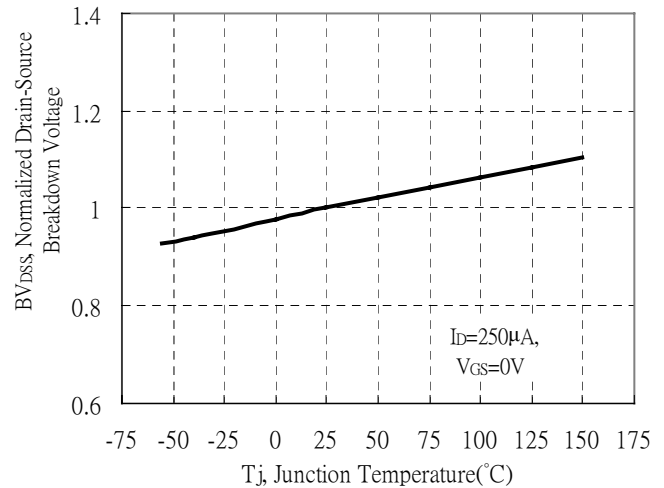


Typical Characteristics

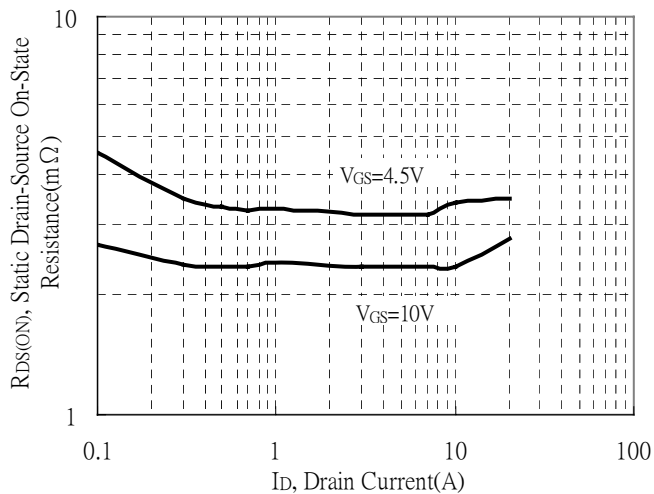
Typical Output Characteristics



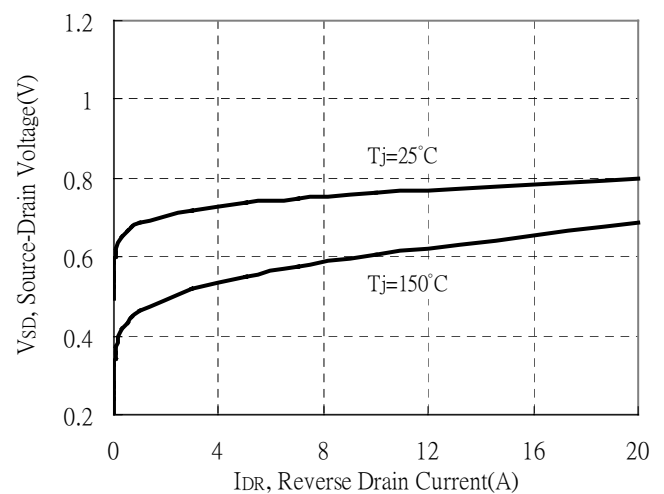
Breakdown Voltage vs Ambient Temperature



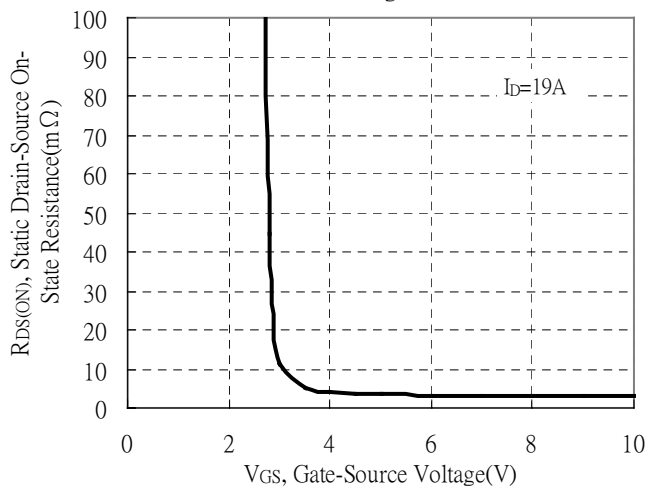
Static Drain-Source On-State resistance vs Drain Current



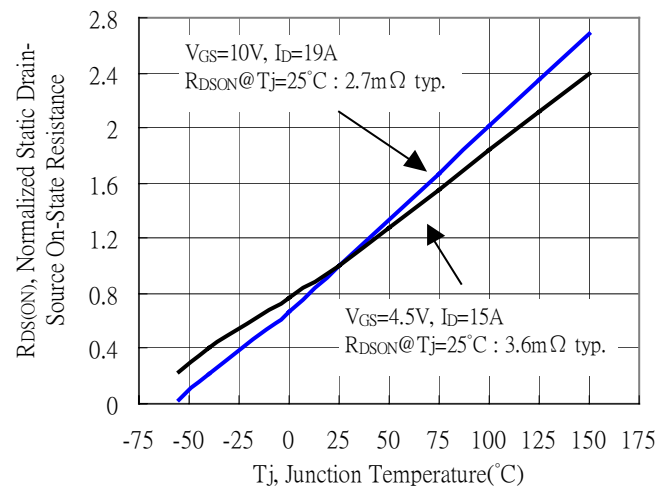
Reverse Drain Current vs Source-Drain Voltage



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

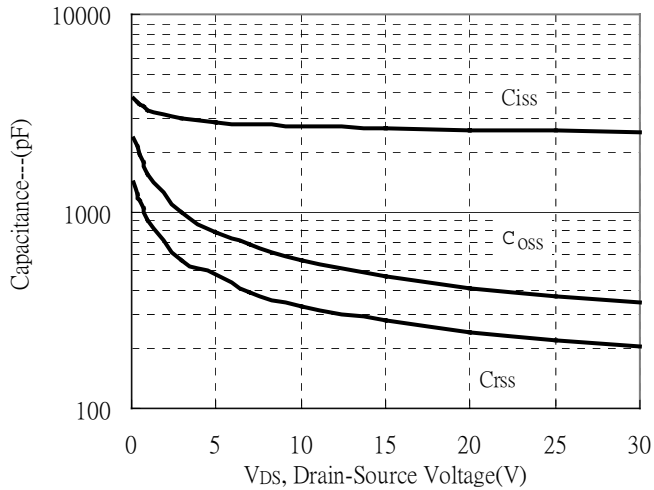


Drain-Source On-State Resistance vs Junction Temperature

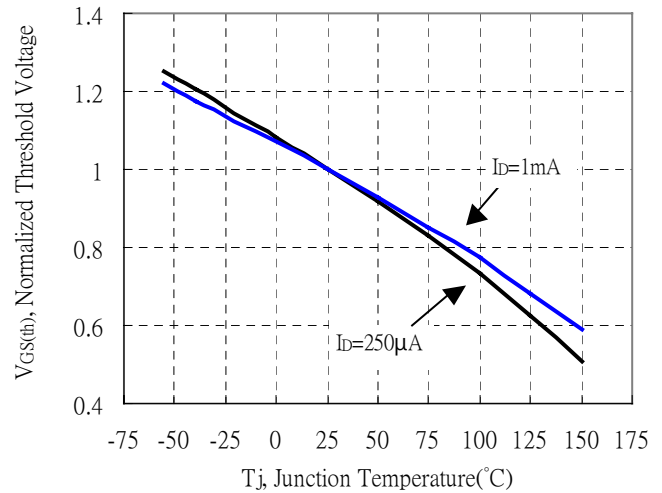


Typical Characteristics(Cont.)

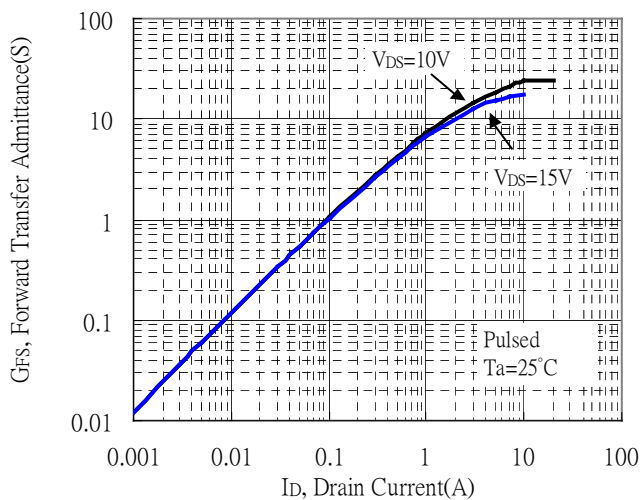
Capacitance vs Drain-to-Source Voltage



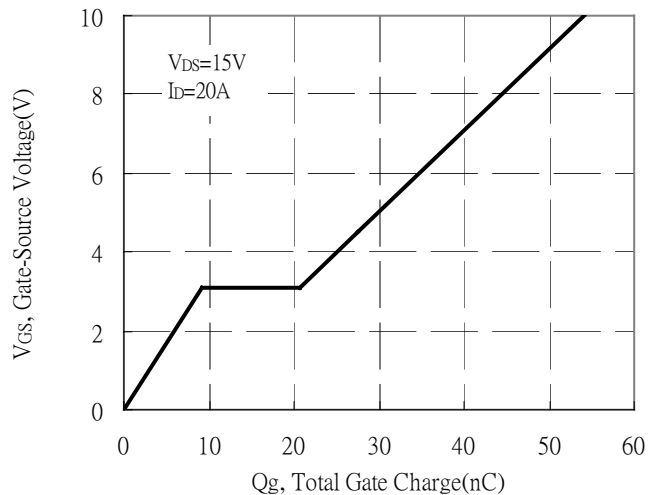
Threshold Voltage vs Junction Temperature



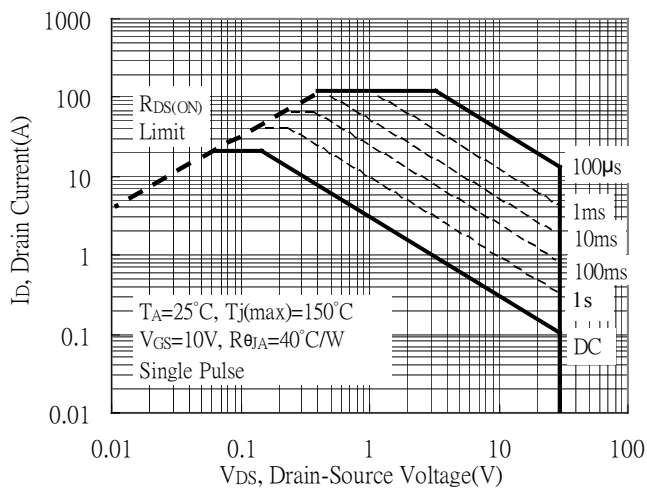
Forward Transfer Admittance vs Drain Current



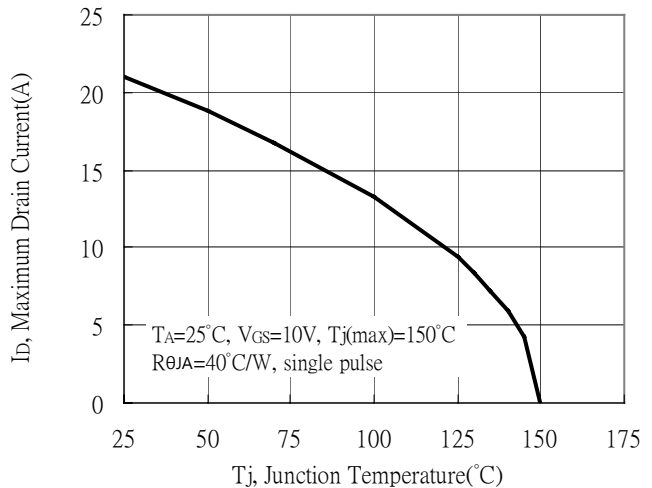
Gate Charge Characteristics



Maximum Safe Operating Area



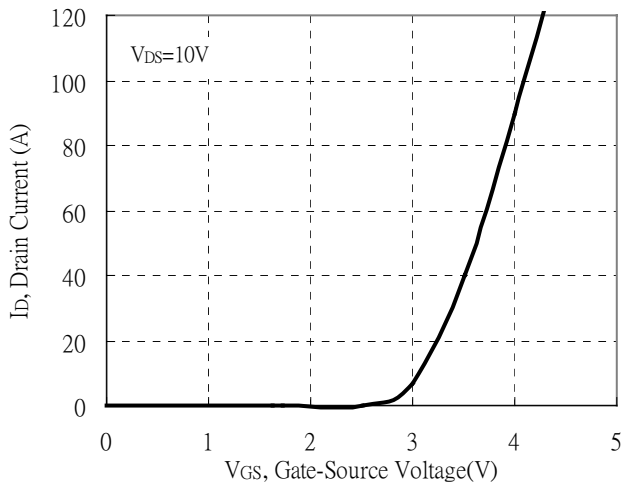
Maximum Drain Current vs Junction Temperature



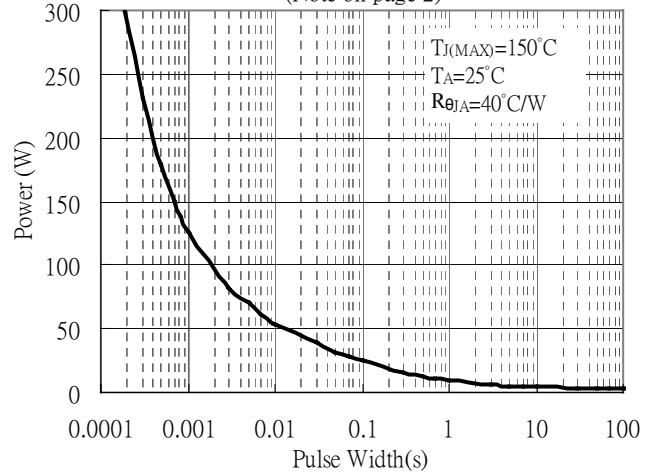


Typical Characteristics(Cont.)

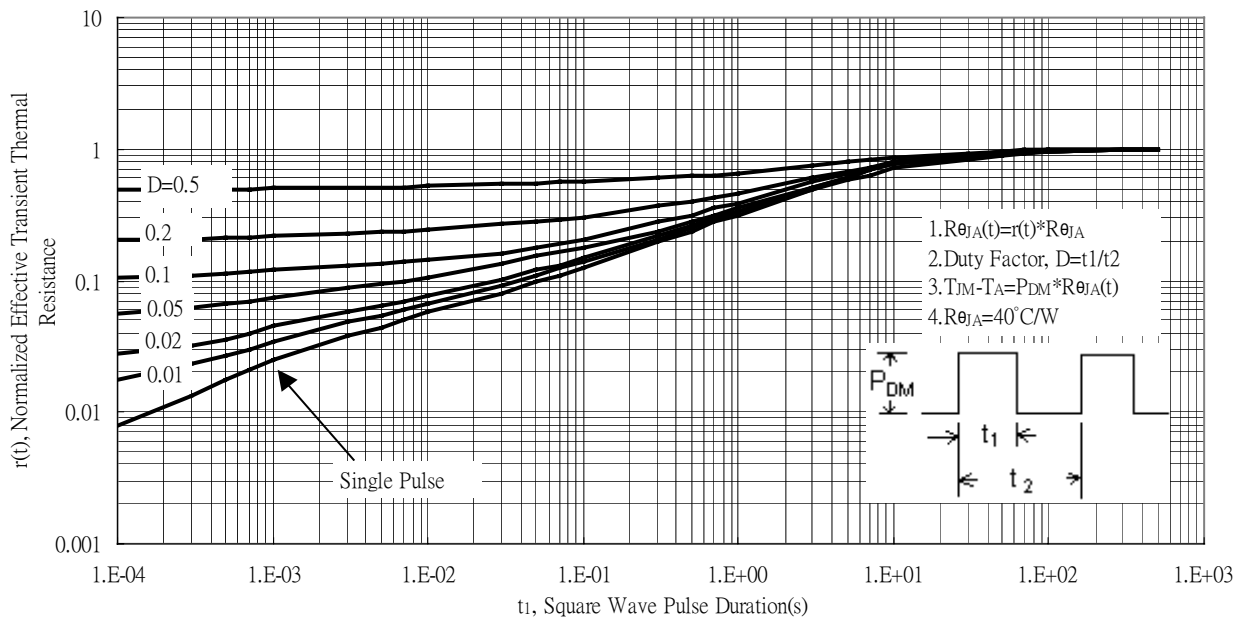
Typical Transfer Characteristics



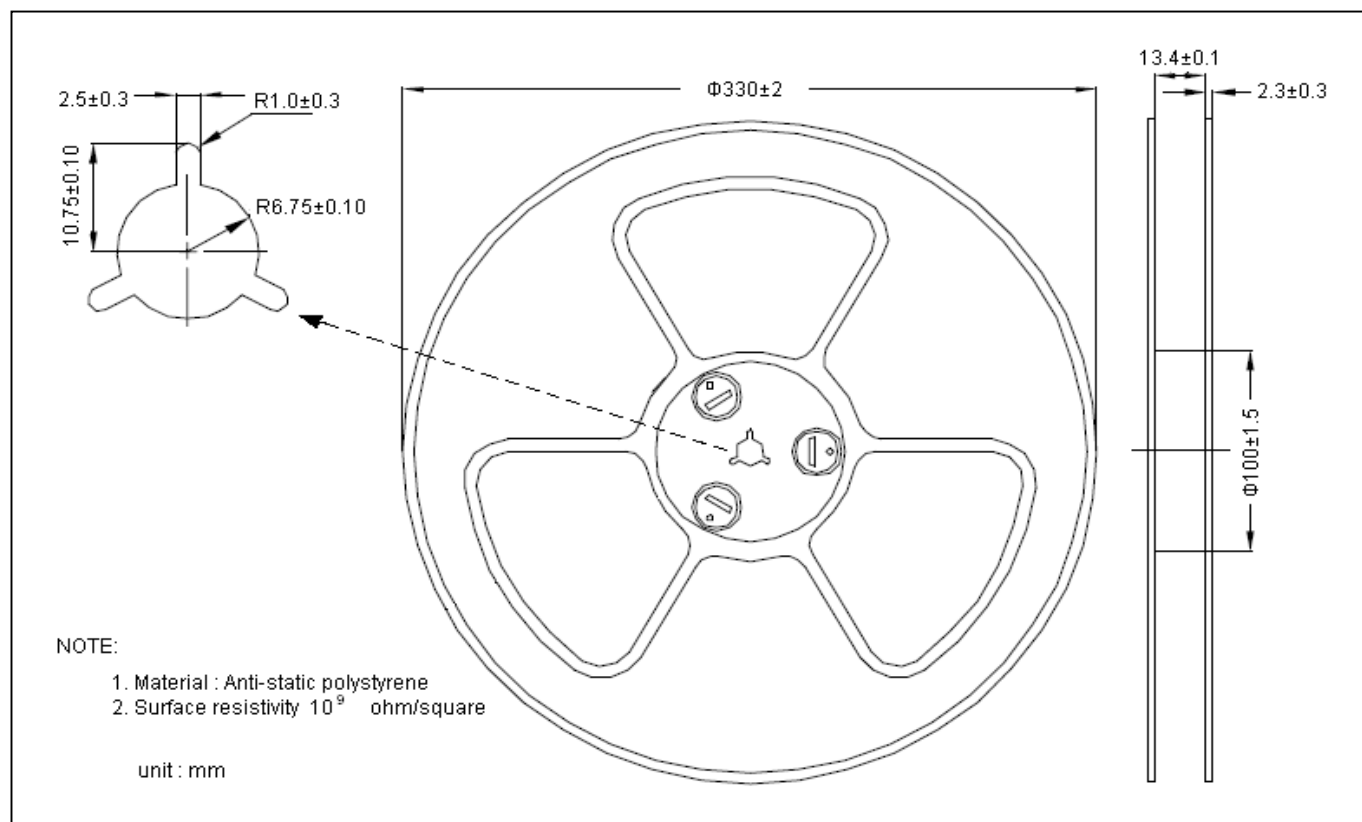
Single Pulse Power Rating, Junction to Ambient
(Note on page 2)



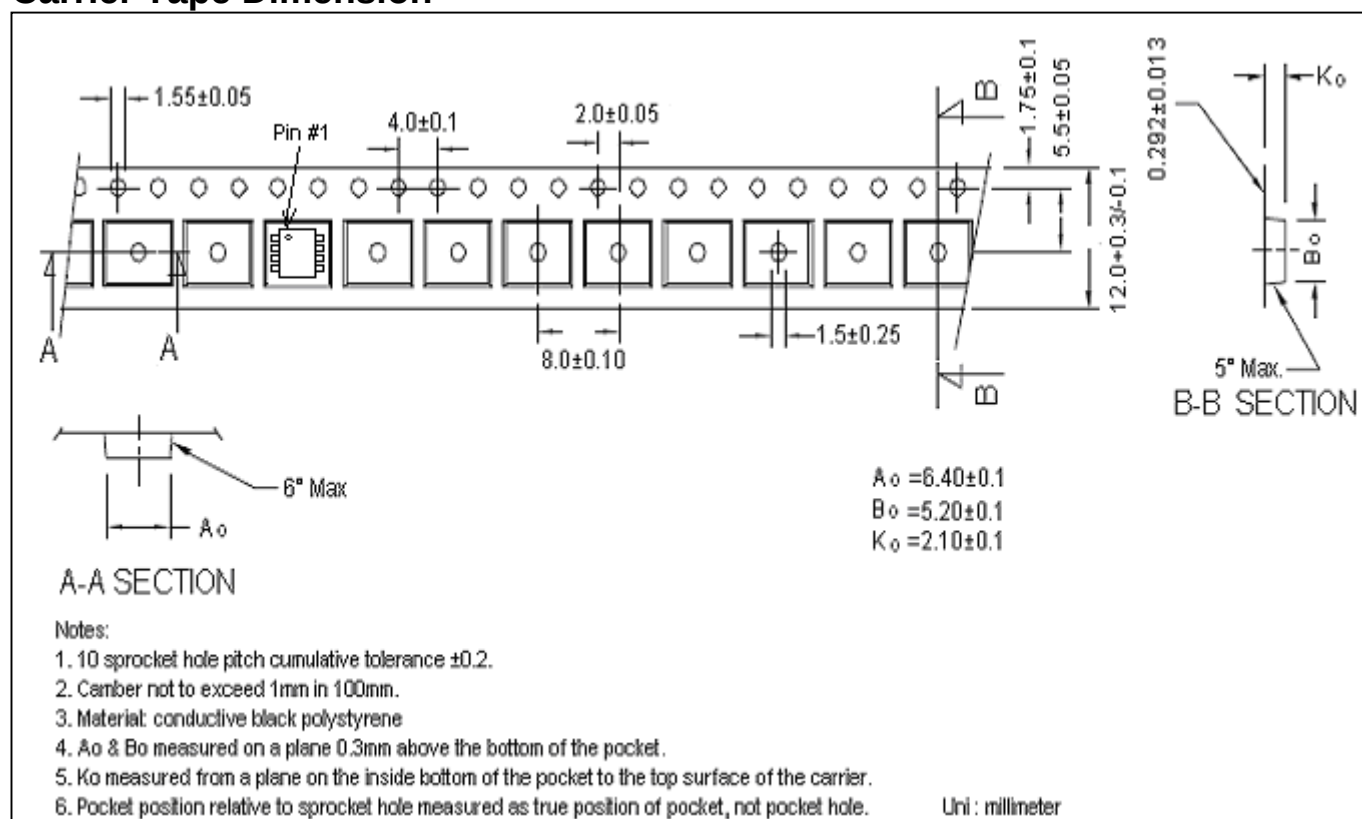
Transient Thermal Response Curves



Reel Dimension



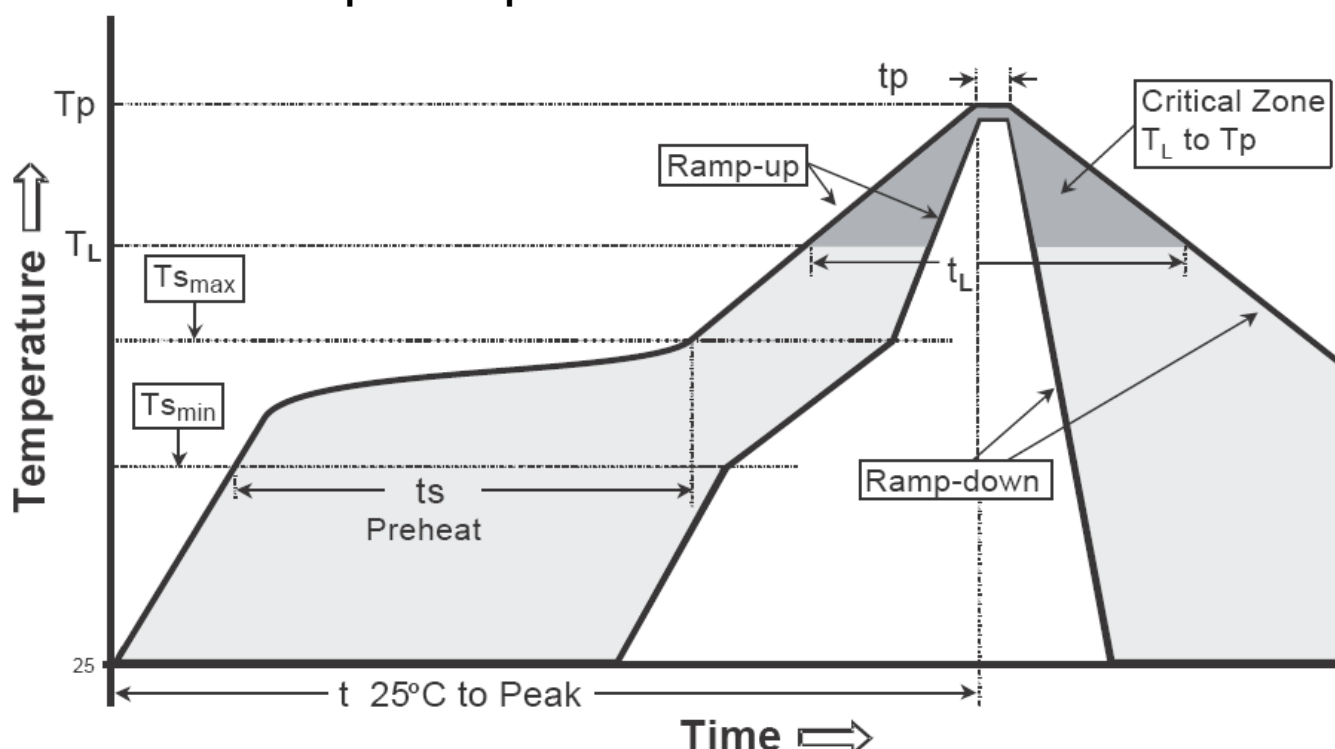
Carrier Tape Dimension



Recommended wave soldering condition

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

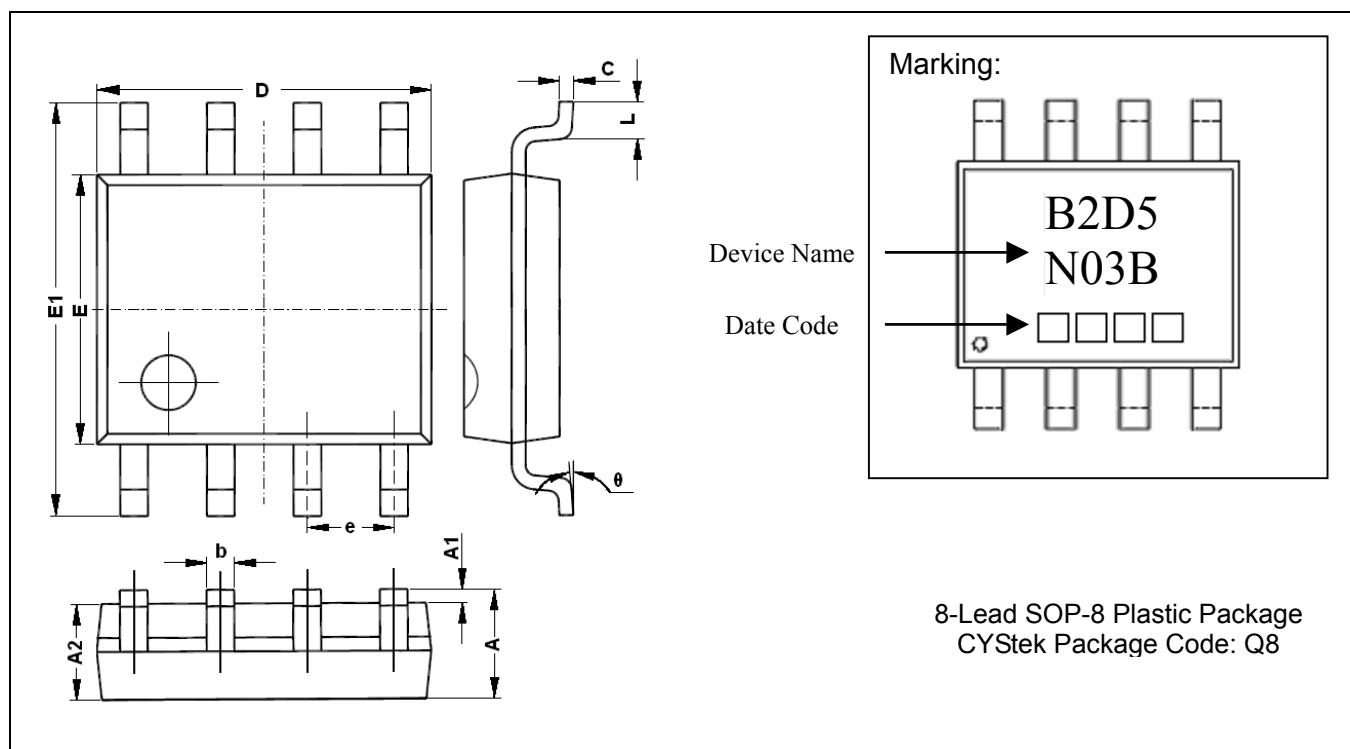
Recommended temperature profile for IR reflow



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)	100°C	150°C
-Temperature Max(Ts max)	150°C	200°C
-Time(ts min to ts max)	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (Tl)	183°C	217°C
- Time (tL)	60-150 seconds	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.

SOP-8 Dimension



DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069	E	3.800	4.000	0.150	0.157
A1	0.100	0.250	0.004	0.010	E1	5.800	6.200	0.228	0.244
A2	1.350	1.550	0.053	0.061	e	1.270	(BSC)	0.050	(BSC)
b	0.330	0.510	0.013	0.020	L	0.400	1.270	0.016	0.050
c	0.170	0.250	0.006	0.010	θ	0	8°	0	8°
D	4.700	5.100	0.185	0.200					

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.

Important Notice:

- All rights are reserved. Reproduction in whole or in part is prohibited without the prior written approval of CYStek.
- CYStek reserves the right to make changes to its products without notice.
- CYStek **semiconductor products are not warranted to be suitable for use in Life-Support Applications, or systems.**
- CYStek assumes no liability for any consequence of customer product design, infringement of patents, or application assistance.