P-Channel Enhancement Mode Power MOSFET

MTB5D0P03Q8

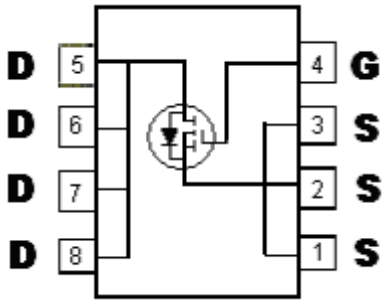
BV_{DSS}	-30V
I_D@V_{GS}=-10V, T_A=25°C	-20A
I_D@V_{GS}=-4.5V, T_A=25°C	-16A
I_D@V_{GS}=-10V, T_C=25°C	-28A
I_D@V_{GS}=-4.5V, T_C=25°C	-22A
R_{DSON}@V_{GS}=-10V, I_D=-20A	4.3mΩ(typ)
R_{DSON}@V_{GS}=-4.5V, I_D=-17A	7.0mΩ(typ)

Features

- Simple drive requirement
- Low on-resistance
- Fast switching speed
- Pb-free and halogen-free package

Equivalent Circuit

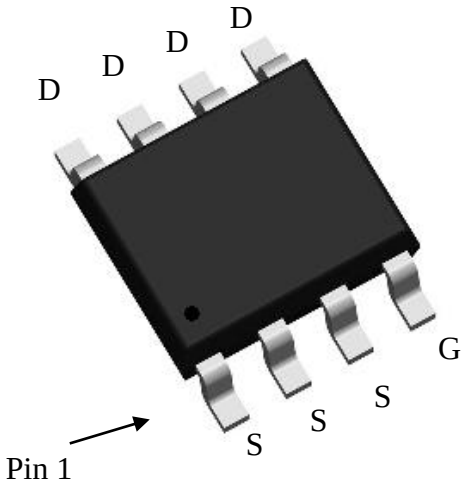
MTB5D0P03Q8



G：Gate　S：Source　D：Drain

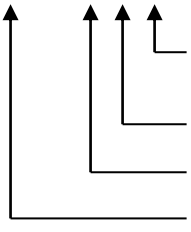
Outline

SOP-8



Ordering Information

Device	Package	Shipping
MTB5D0P03Q8-0-T3-G	SOP-8 (Pb-free lead plating and halogen-free package)	2500 pcs / tape & reel
MTB5D0P03Q8-0-TF-G	SOP-8 (Pb-free lead plating and halogen-free package)	4000 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, TF : 4000 pcs/tape & reel, 13” reel

Product rank, zero for no rank products

Product name

Absolute Maximum Ratings (Tc=25°C, unless otherwise noted)

Parameter		Symbol	Limits	Unit
Drain-Source Breakdown Voltage		BV_{DSS}	-30	V
Gate-Source Voltage		V_{GS}	±25	
Continuous Drain Current @T_A=25 °C , V_{GS}=-10V		I_{DSM}	-20	A
Continuous Drain Current @T_A=70 °C , V_{GS}=-10V			-16	
Continuous Drain Current @T_A=25 °C , V_{GS}=-4.5V			-16	
Continuous Drain Current @T_A=70 °C , V_{GS}=-4.5V			-12.8	
Continuous Drain Current @T_C=25 °C , V_{GS}=-10V		I_D	-28	
Continuous Drain Current @T_C=100 °C , V_{GS}=-10V			-17.7	
Continuous Drain Current @T_C=25 °C , V_{GS}=-4.5V			-22	
Continuous Drain Current @T_C=100 °C , V_{GS}=-4.5V			-13.9	
Pulsed Drain Current (Note 1)		I_{DM}	-120	
Avalanche Current		I_{AS}	-50	
Avalanche Energy @ L=0.1mH, I_D=-50A, V_{DD}=-25V		E_{AS}	125	mJ
Power Dissipation	T_C=25 °C	P_D	6.3	W
	T_C=100 °C		2.5	
Power Dissipation (Note 2)	T_A=25 °C	P_{DSM}	3.1	
	T_A=70 °C		2	
Operating Junction and Storage Temperature Range		Tj ; Tstg	-55~+150	°C

Note : 1.Pulse width limited by maximum junction temperature.
2.Surface mounted on 1 in² copper pad of FR-4 board, t≤10s.

Thermal Resistance Ratings

Thermal Resistance	Symbol	Maximum	Unit
Junction-to-Case	$R_{\theta JC}$	20	°C / W
Junction-to-Ambient (Note)	$R_{\theta JA}$	40	

Note : When mounted on a 1 in^2 pad of 2 oz copper, t≤10s; 125°C/W when mounted on minimum copper pad. The value in any given application depends on the user's specific board design.

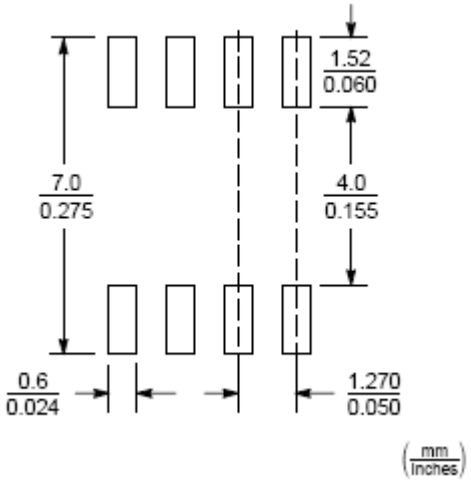
Electrical Characteristics (Tc=25°C, unless otherwise noted)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	-30	-	-	V	V_{GS}=0V, I_D=-250μA
$\Delta BV_{DSS}/\Delta Tj$	-	-12	-	mV/°C	I_D=-250μA, referenced to 25°C
$V_{GS(th)}$	-1.4	-	-2.5	V	V_{DS}=V_{GS}, I_D=-250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±25V, V_{DS}=0V
I_{DSS}	-	-	-1	μA	V_{DS}=-30V, V_{GS}=0V
I_{DSS}	-	-	-10		V_{DS}=-24V, V_{GS}=0V, Tj=125°C
$R_{DS(ON)}$ (Note 1)	-	4.3	5.6	mΩ	I_D=-20A, V_{GS}=-10V
	-	7.0	9.5		I_D=-17A, V_{GS}=-4.5V

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
G_{FS} (Note 1)	-	59	-	S	V_{DS}=-5V, I_D=-20A
Dynamic					
Ciss	-	6458	-	pF	V_{DS}=-15V, V_{GS}=0V, f=1MHz
Coss	-	849	-		
Crss	-	402	-		
$t_{d(ON)}$ (Note 1&2)	-	23.8	-	ns	V_{DS}=-15V, I_D=-1A, V_{GS}=-10V, R_G=6Ω
t_r (Note 1&2)	-	25.6	-		
$t_{d(OFF)}$ (Note 1&2)	-	187.2	-		
t_f (Note 1&2)	-	69.4	-		
Qg (Note 1&2)	-	113	-	nC	V_{DS}=-15V, I_D=-20A, V_{GS}=-10V
Qgs (Note 1&2)	-	19.6	-		
Qgd (Note 1&2)	-	19.6	-		
Rg	-	3	-	Ω	f=1MHz
Source-Drain Diode					
I_S	-	-	-2.1	A	
I_{SM}(Note 3)	-	-	-8.4		
V_{SD}(Note 1)	-	-0.69	-1	V	I_S=-2.1A, V_{GS}=0V
trr	-	28.4	-	ns	I_F=-20A, dI_F/dt=100A/μs
Qrr	-	20.8	-	nC	

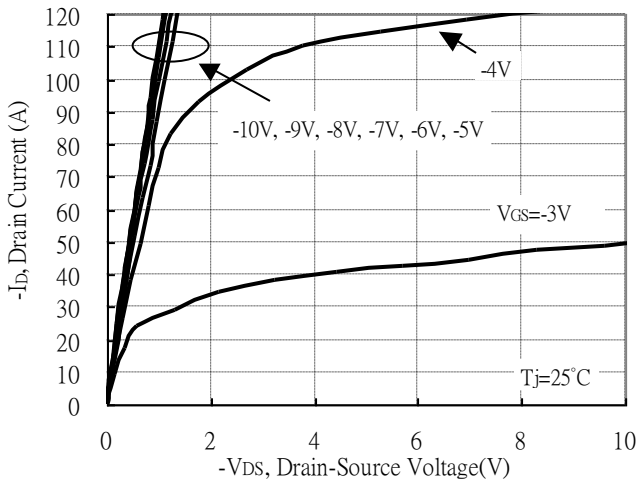
Note : 1.Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%
2.Independent of operating temperature
3.Pulse width limited by maximum junction temperature

Recommended Soldering Footprint

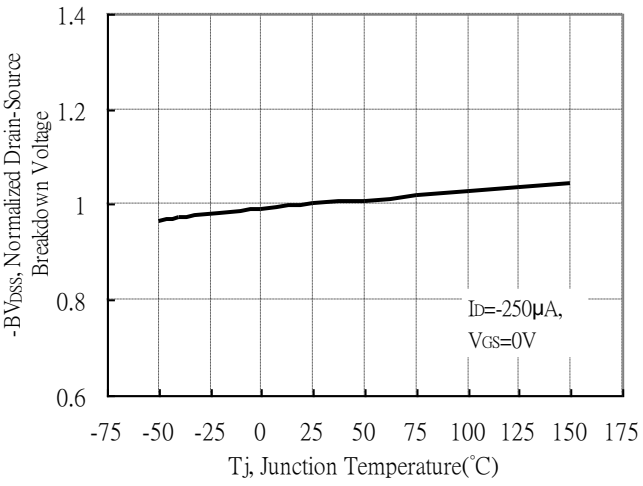


Typical Characteristics

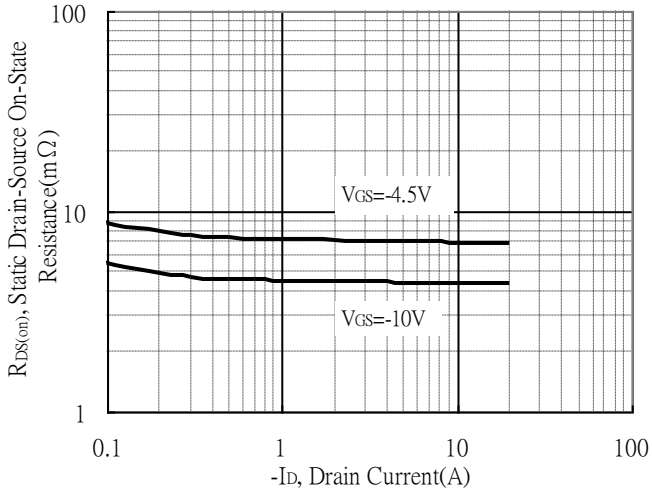
Typical Output Characteristics



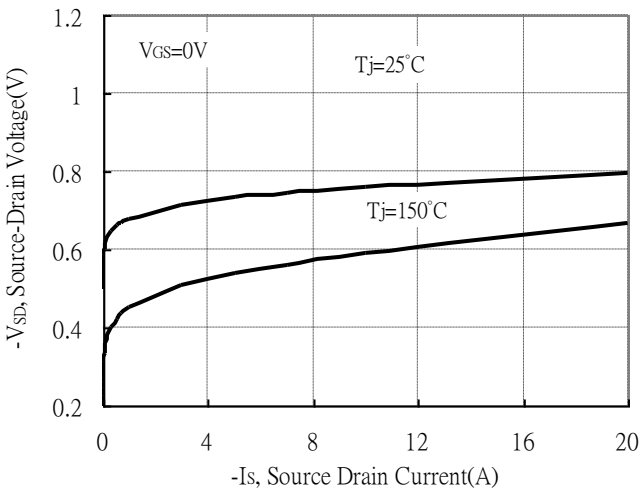
Normalized Brekdown Voltage vs Ambient Temperature



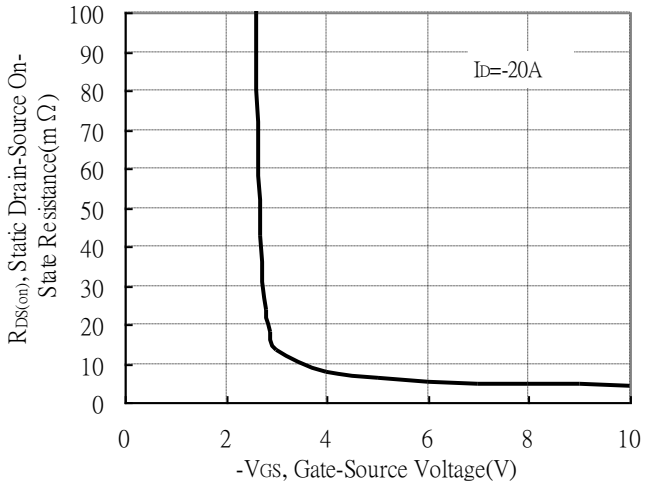
Static Drain-Source On-State resistance vs Drain Current



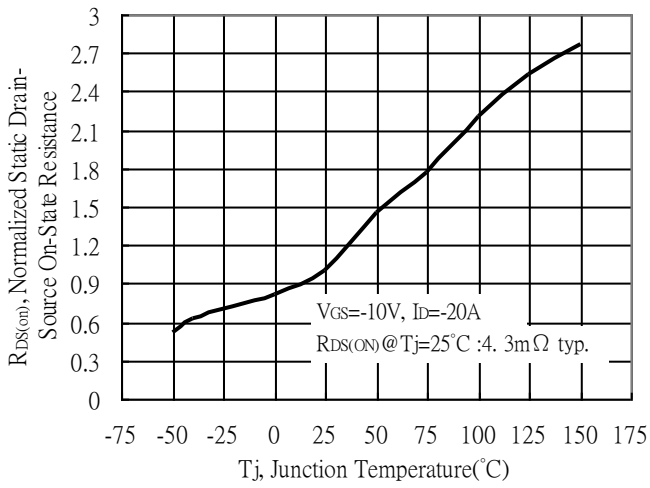
Source Drain Current vs Source-Drain Voltage



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

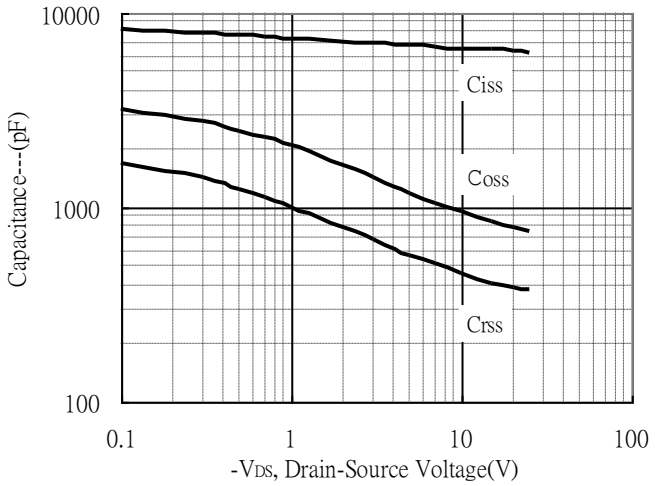


Normalized Drain-Source On-State Resistance vs Junction Tempearture

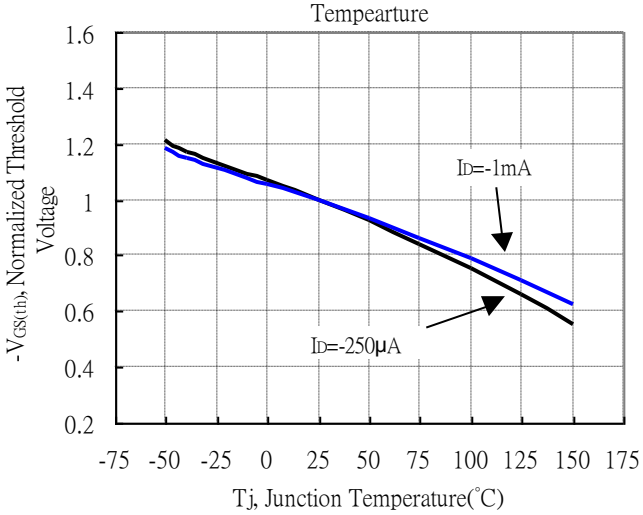


Typical Characteristics(Cont.)

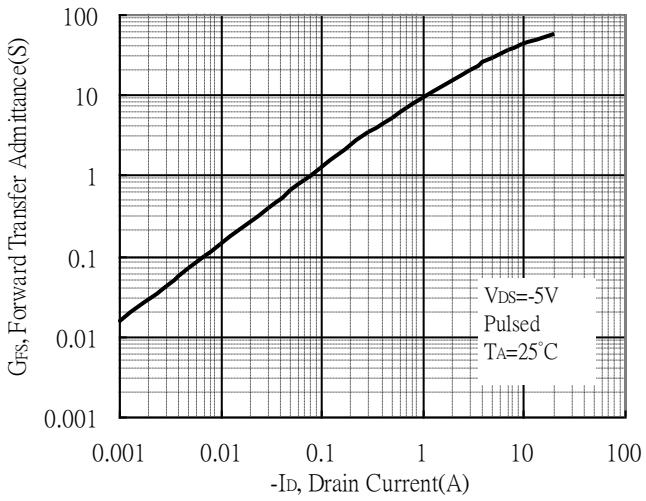
Capacitance vs Drain-to-Source Voltage



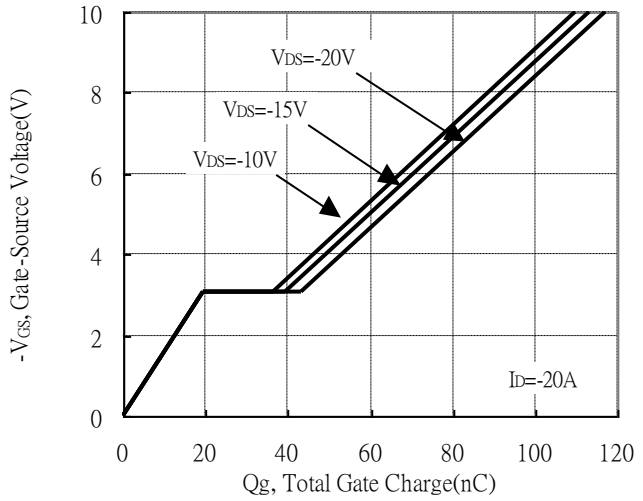
Normalized Threshold Voltage vs Junction Tempearture



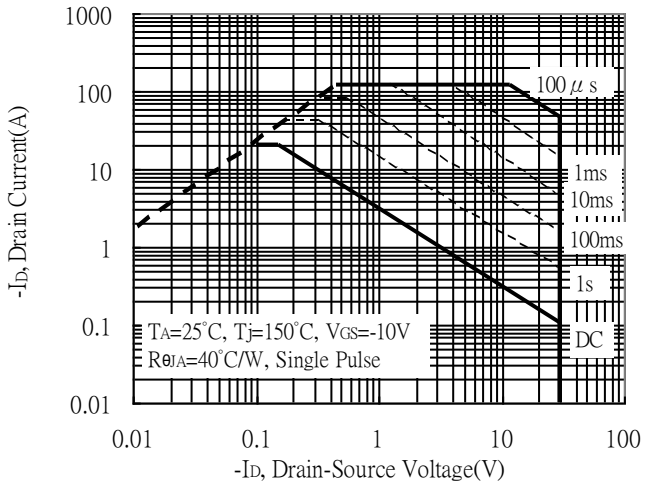
Forward Transfer Admittance vs Drain Current



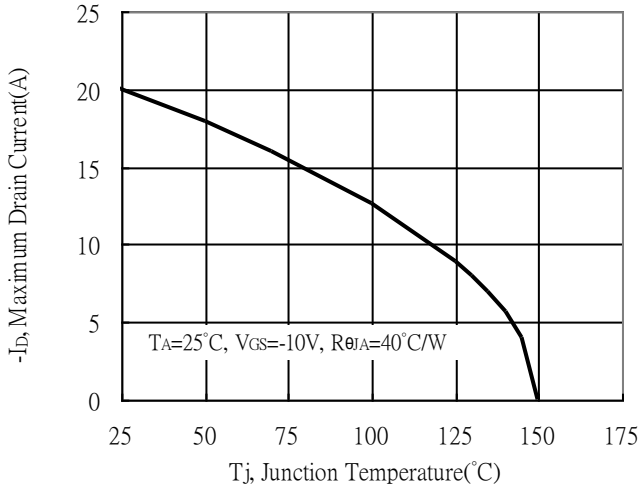
Gate Charge Characteristics



Maximum Safe Operating Area

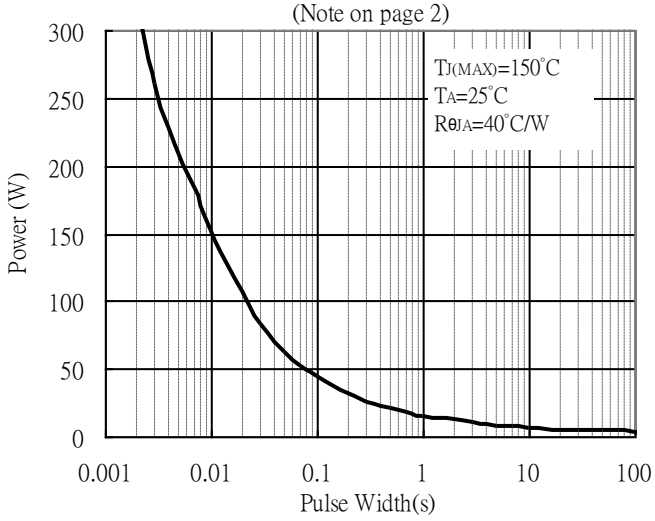


Maximum Drain Current vs Junction Temperature

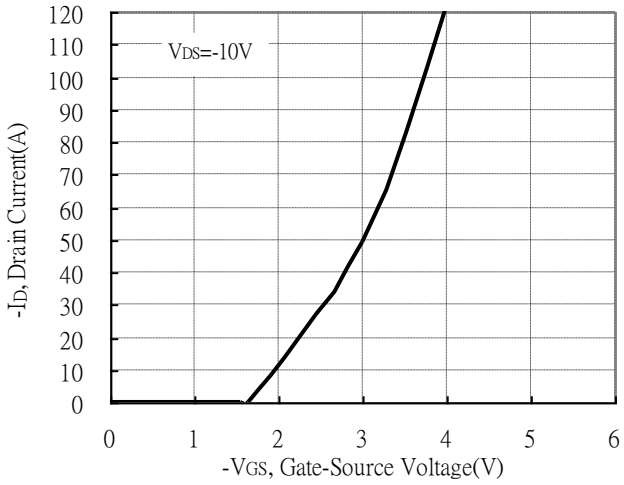


Typical Characteristics(Cont.)

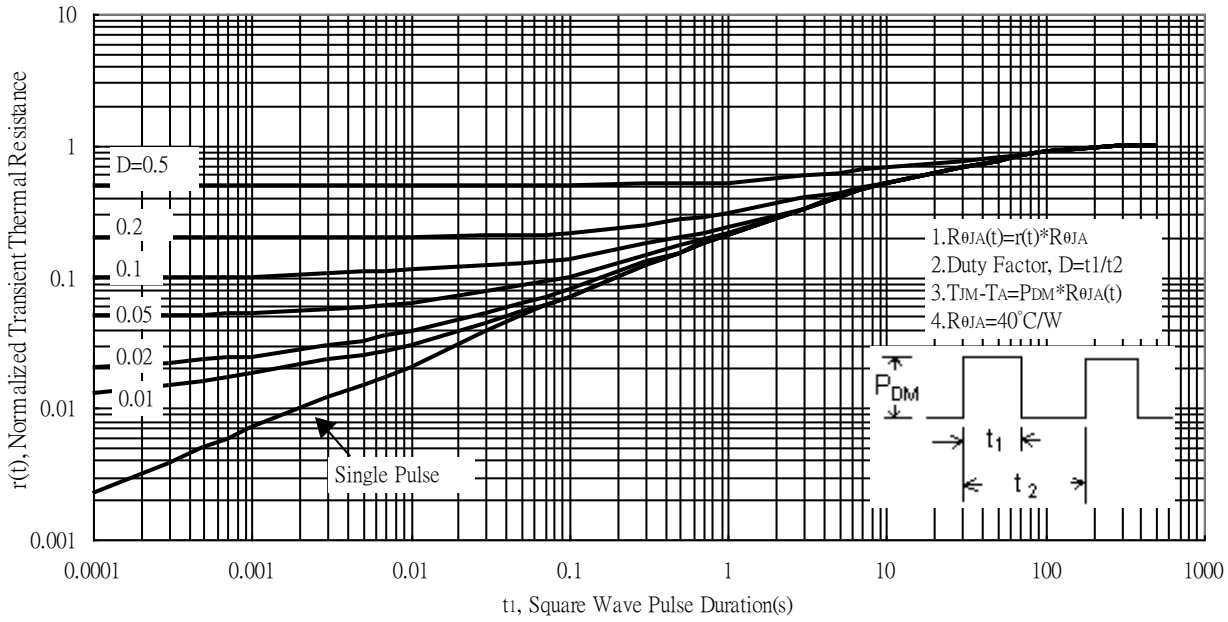
Single Pulse Power Rating, Junction to Ambient
(Note on page 2)



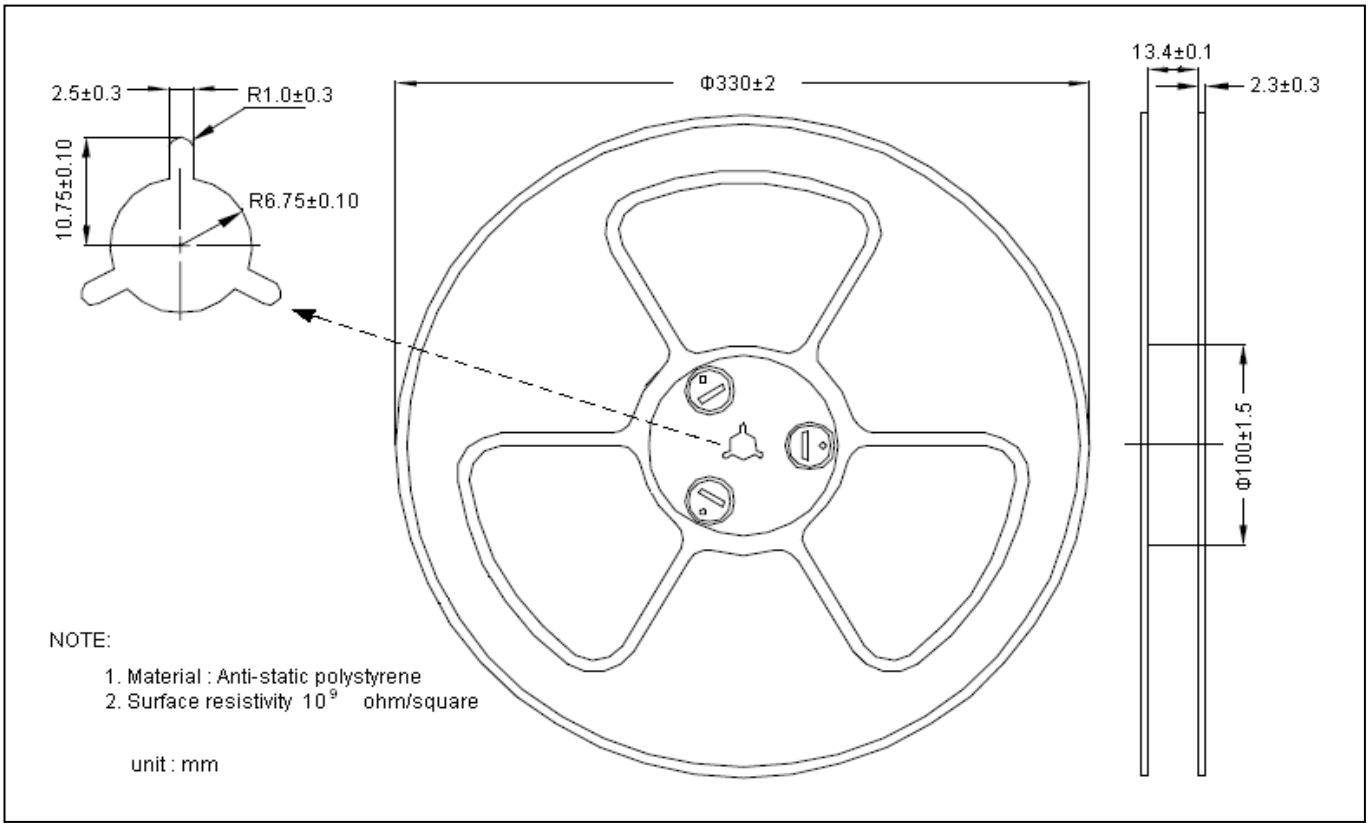
Typical Transfer Characteristics



Transient Thermal Response Curves



Reel Dimension

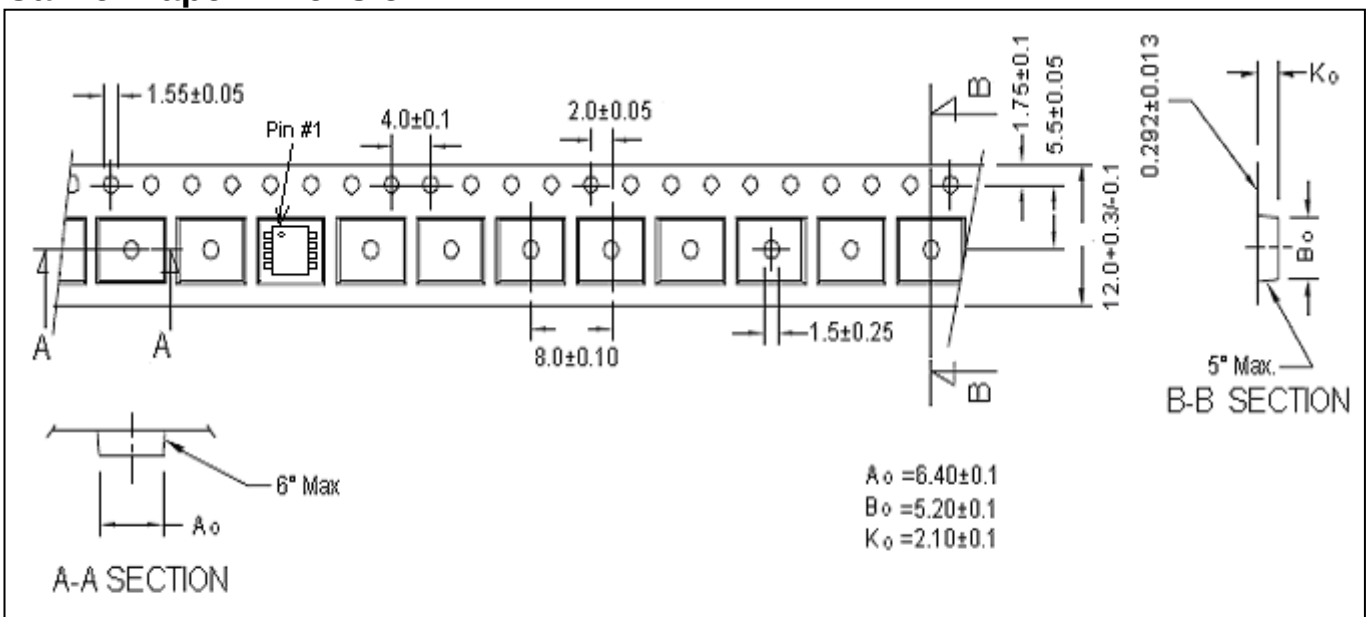


NOTE:

1. Material : Anti-static polystyrene
2. Surface resistivity 10^9 ohm/square

unit : mm

Carrier Tape Dimension



Ao =6.40±0.1
Bo =5.20±0.1
Ko =2.10±0.1

Notes:

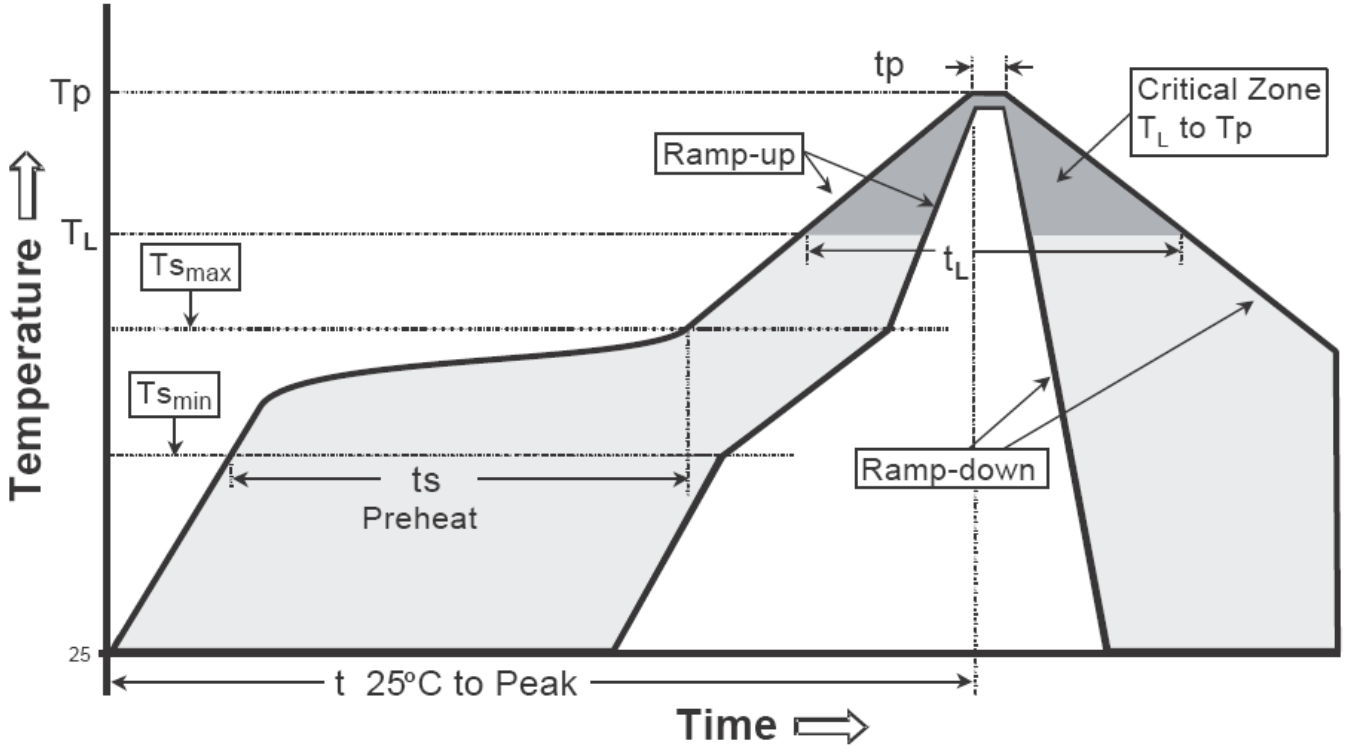
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material: conductive black polystyrene
4. Ao & Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Uni : millimeter

Recommended wave soldering condition

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

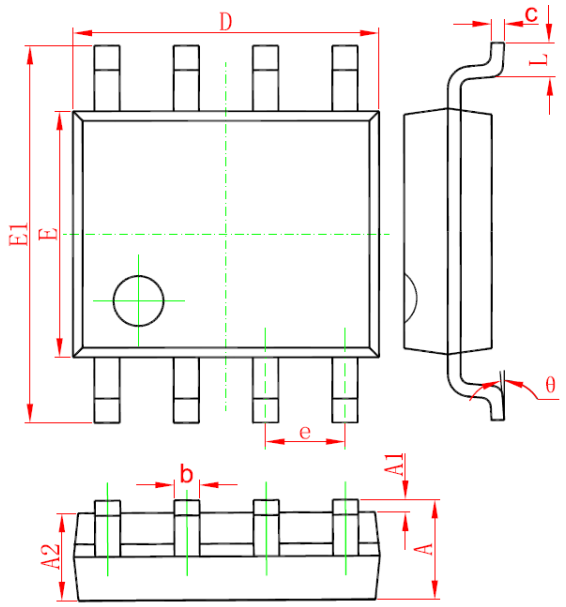
Recommended temperature profile for IR reflow



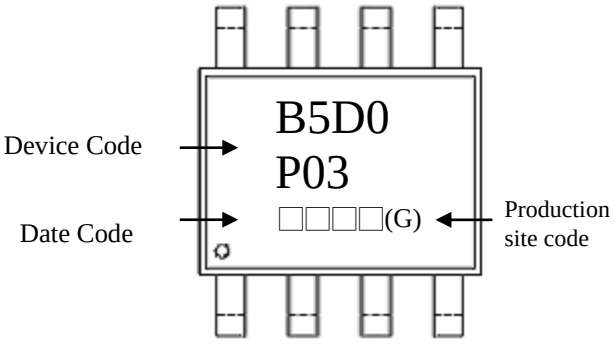
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(Ts min) −Temperature Max(Ts max) −Time(ts min to ts max)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (TL) − 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.

SOP-8 Dimension



Marking:



Date Code(counting from left to right) :
1st code: year code, the last digit of Christian year
2nd 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
3rd and 4th codes : production serial number, 01~99

Production site code : blank→ JCET, G →GEM

8-Lead SOP-8 Plastic Package
CYStek Package Code: Q8

*: Typical

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		*0.050	
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.