Dual N-Channel Enhancement Mode Power MOSFET

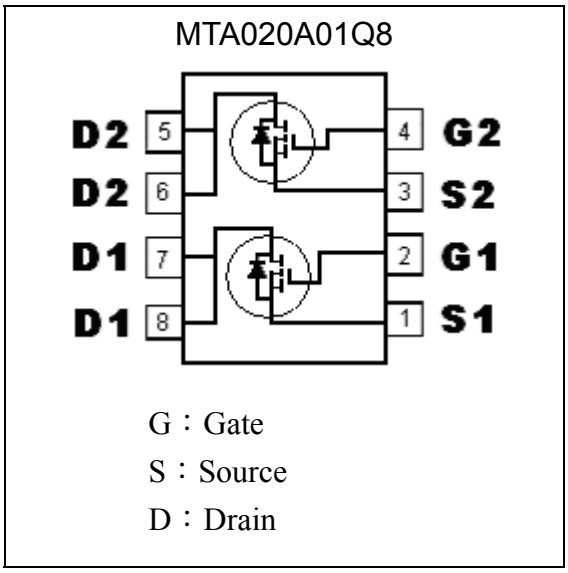
MTA020A01Q8

BV_{DSS}	**14V**
I_D@V_{GS}=10V, T_A=25°C	**7A**
I_D@V_{GS}=10V, T_A=70°C	**5.6A**
R_{DSON}@V_{GS}=10V, I_D=7A	**15.4mΩ(typ)**
R_{DSON}@V_{GS}=4.5V, I_D=5A	**21.7mΩ(typ)**

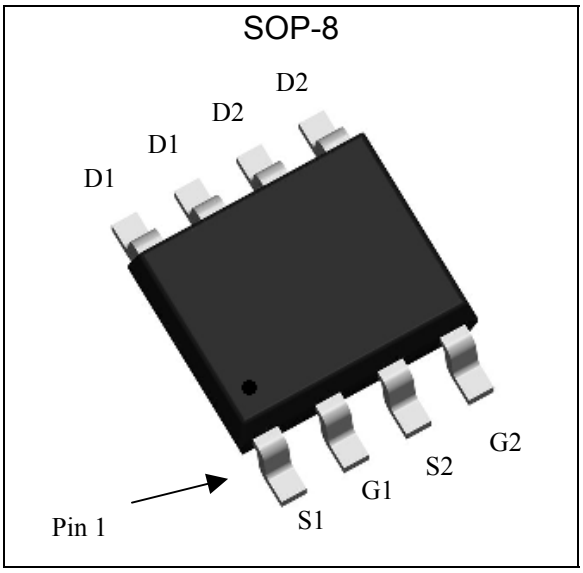
Features

- Simple drive requirement
- Low on-resistance
- Fast switching speed
- Dual N-ch MOSFET package
- Pb-free lead plating & Halogen-free package

Equivalent Circuit



Outline



Ordering Information

Device	Package	Shipping
MTA020A01Q8-0-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}	14	V
Gate-Source Voltage	V_{GS}	±8	
Continuous Drain Current @ V_{GS}=10V, T_C=25°C	I_D	11.3	A
Continuous Drain Current @ V_{GS}=10V, T_C=100°C		7.2	
Continuous Drain Current @ V_{GS}=10V, T_A=25°C		7 (Note 2)	
Continuous Drain Current @ V_{GS}=10V, T_A=70°C		5.6 (Note 2)	
Pulsed Drain Current	I_{DM}	20 (Note 1)	
Power Dissipation for Dual Operation	P_D	2	W
Power Dissipation for Single Operation		1.6 (Note 2)	
		0.9 (Note 3)	
Operating Junction and Storage Temperature Range	Tj, Tstg	-55~+150	°C

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{\theta JC}$	35	°C/W
Thermal Resistance, Junction-to-ambient, max, dual	$R_{\theta JA}$	62.5	
Thermal Resistance, Junction-to-ambient, max , single operation		78 (Note 2)	
		135 (Note 3)	

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

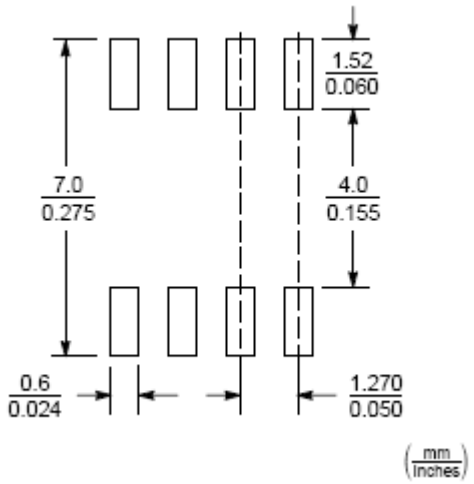
Characteristics (Tj=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	14	-	-	V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	0.5	-	1.0		V_{DS} =V_{GS}, I_D=250μA
G_{FS} *1	-	9.8	-	S	V_{DS} =5V, I_D=7A
I_{GSS}	-	-	±100	nA	V_{GS}=±8V, V_{DS}=0V
I_{DSS}	-	-	1	μA	V_{DS} =14V, V_{GS} =0V
	-	-	25		V_{DS} =10V, V_{GS} =0V, Tj=70°C
$R_{DS(ON)}$ *1	-	15.4	22	mΩ	V_{GS} =4.5V, I_D=7A
	-	21.7	32		V_{GS} =2.5V, I_D=5A
Dynamic					
Qg *1, 2	-	6.3	-	nC	V_{DS}=10V, I_D=7A, V_{GS}=4.5V
Qgs *1, 2	-	0.7	-		
Qgd *1, 2	-	2.7	-		
$t_{d(ON)}$ *1, 2	-	5.6	-	ns	V_{DS}=10V, I_D=7A, V_{GS}=5V, R_G=3.3Ω
tr *1, 2	-	16	-		
$t_{d(OFF)}$ *1, 2	-	22.8	-		
t_f *1, 2	-	9.8	-		

Ciss	-	374	-	pF	V_{GS}=0V, V_{DS}=10V, f=1MHz
Coss	-	112	-		
Crss	-	96	-		
Rg	-	2.4	-	Ω	f=1MHz
Source-Drain Diode					
I_S *1	-	-	2.3	A	
I_{SM} *3	-	-	9.2		
V_{SD} *1	-	0.88	1.2	V	I_S=7A, V_{GS}=0V
trr *1	-	10	-	ns	I_F=7A, dI_F/dt=100A/μs
Qrr *1	-	1.4	-	nC	

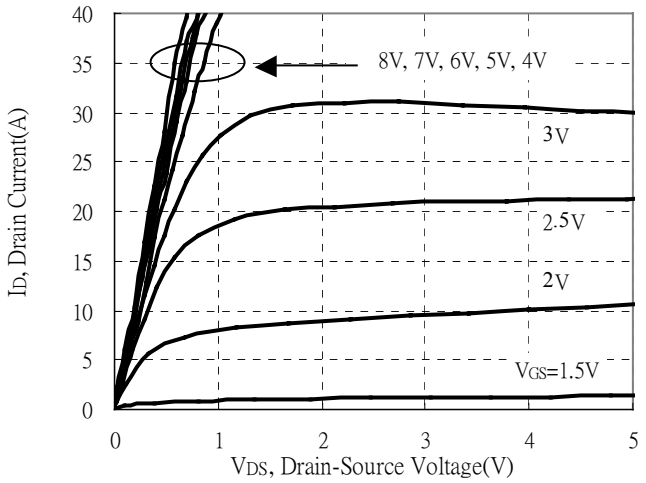
Note : *1.Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%
*2.Independent of operating temperature
*3.Pulse width limited by maximum junction temperature.

Recommended Soldering Footprint

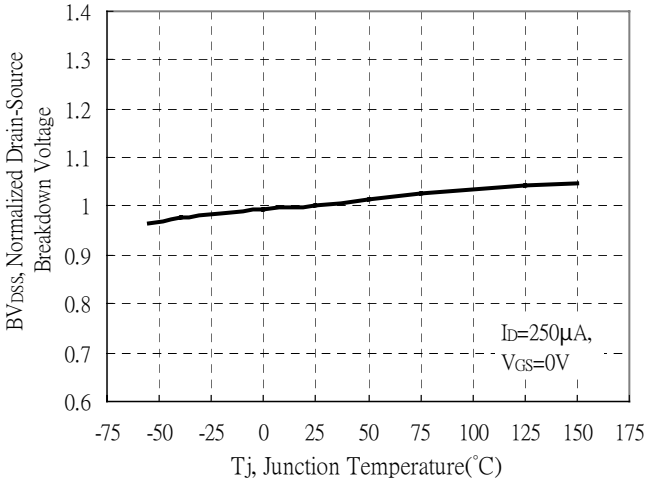


Typical Characteristics

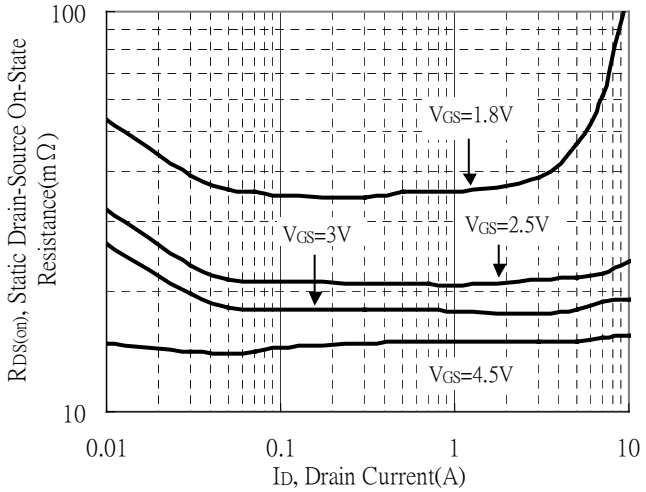
Typical Output Characteristics



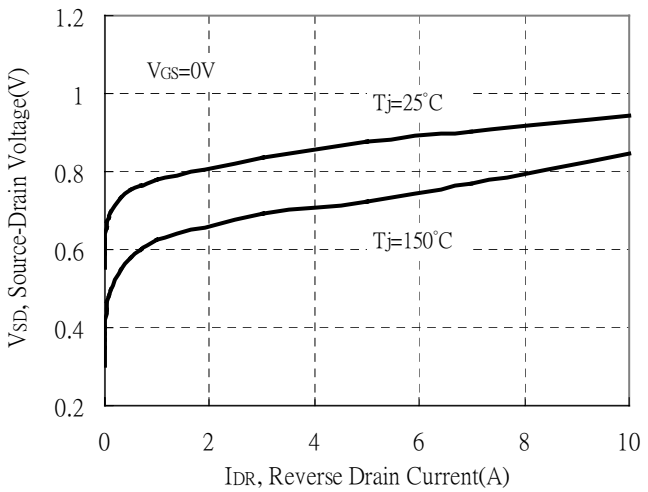
Brekdown Voltage vs Ambient Temperature



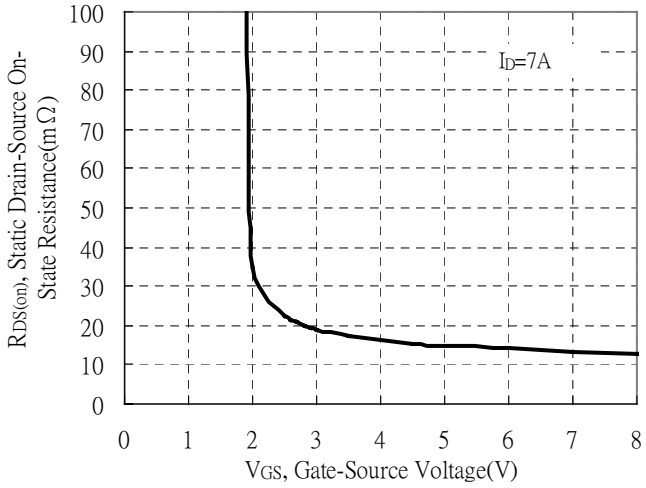
Static Drain-Source On-State resistance vs Drain Current



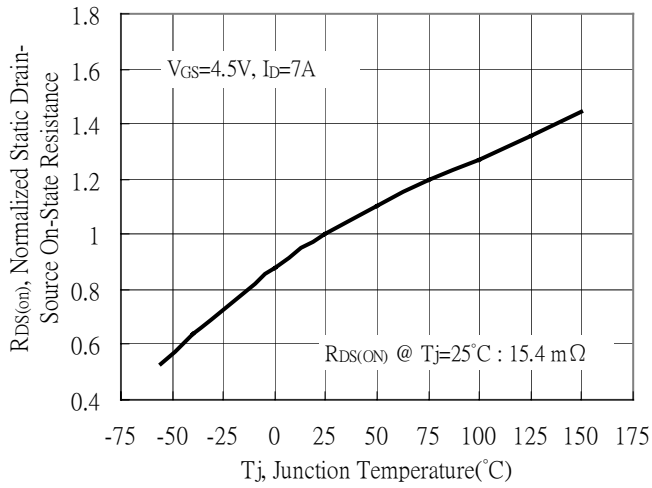
Reverse Drain Current vs Source-Drain Voltage



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

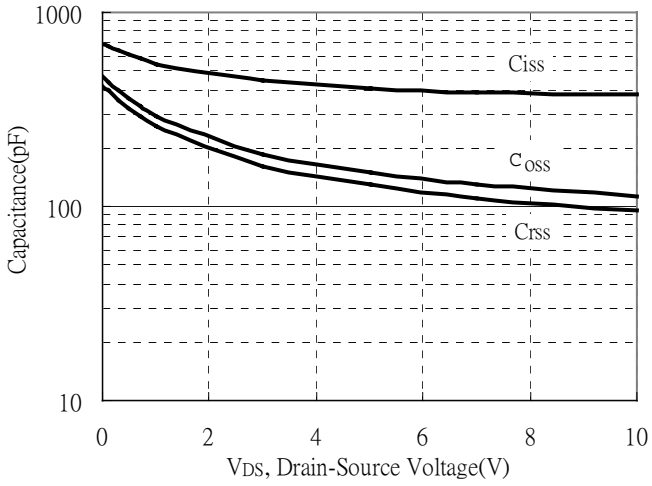


Drain-Source On-State Resistance vs Junction Tempearture

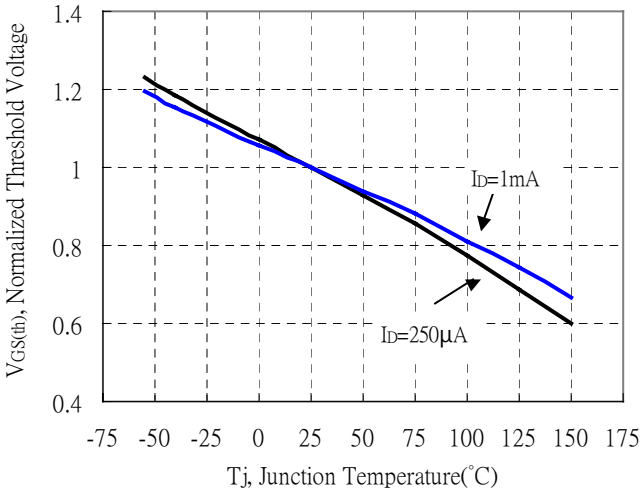


Typical Characteristics(Cont.)

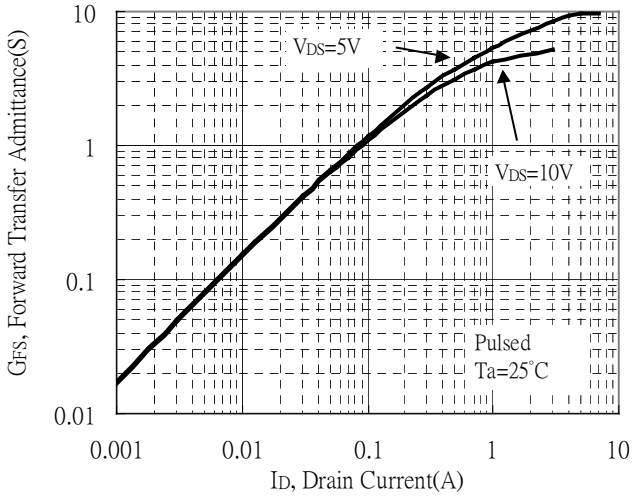
Capacitance vs Drain-to-Source Voltage



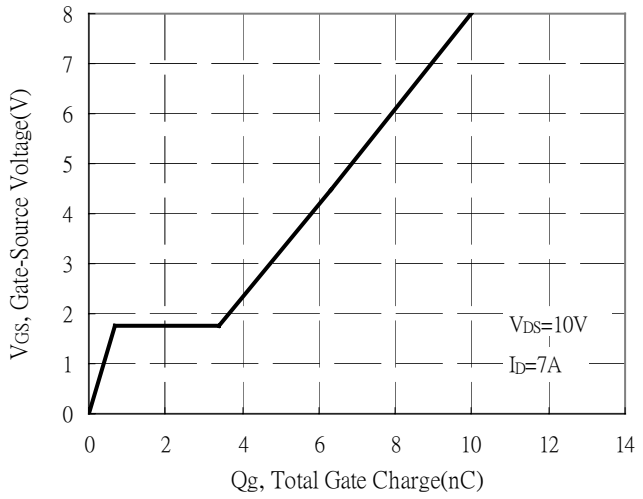
Threshold Voltage vs Junction Tempearture



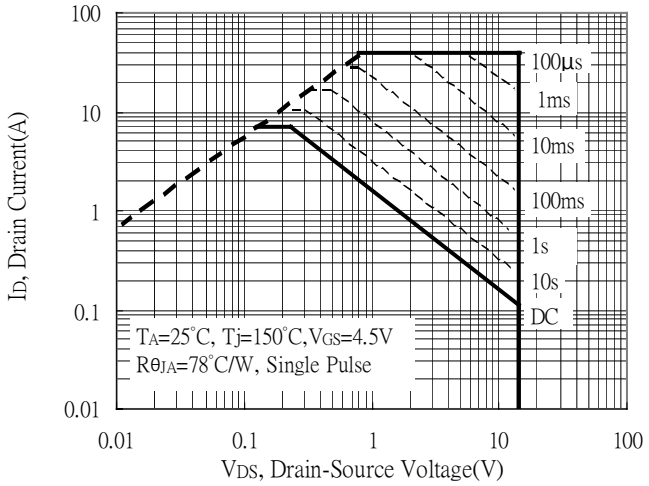
Forward Transfer Admittance vs Drain Current



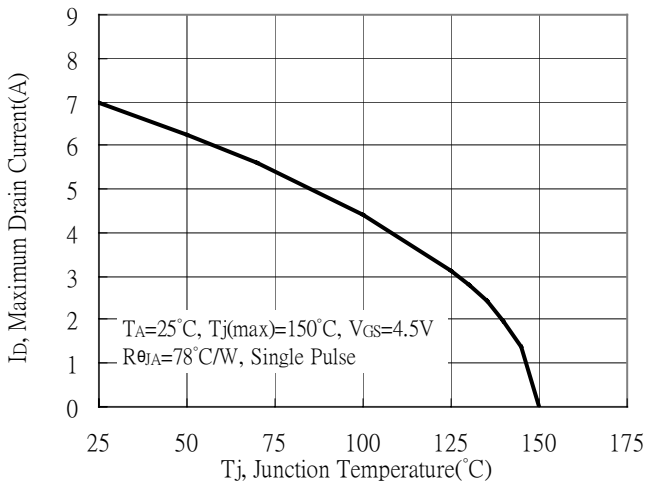
Gate Charge Characteristics



Maximum Safe Operating Area

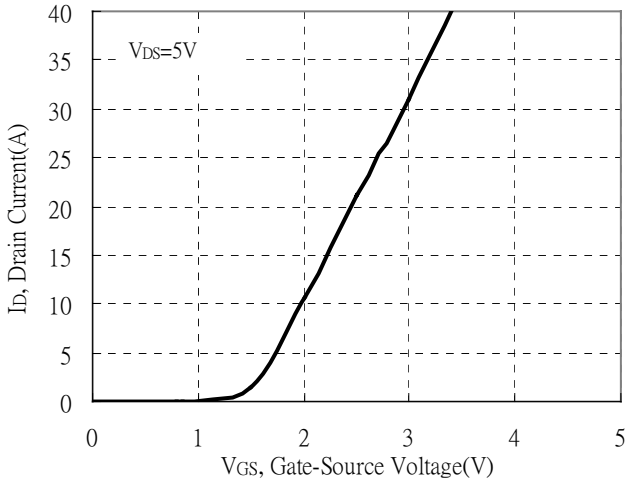


Maximum Drain Current vs JunctionTemperature

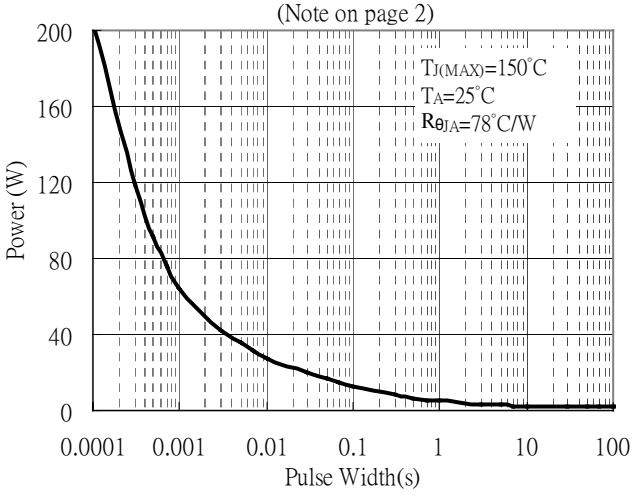


Typical Characteristics(Cont.)

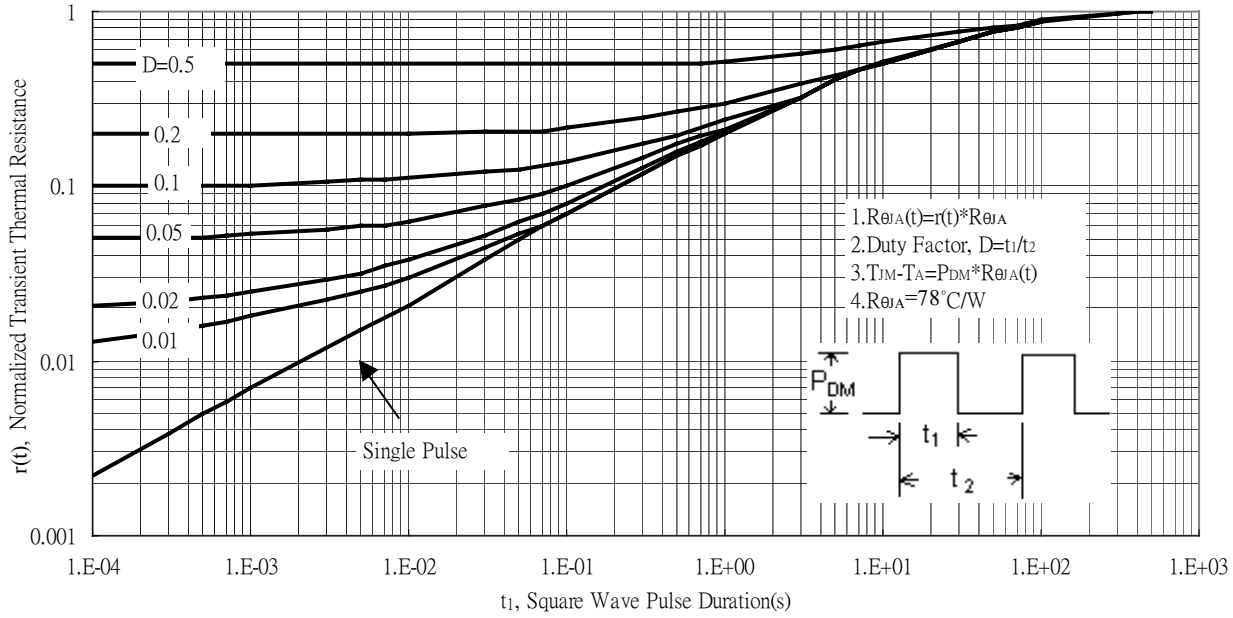
Typical Transfer Characteristics



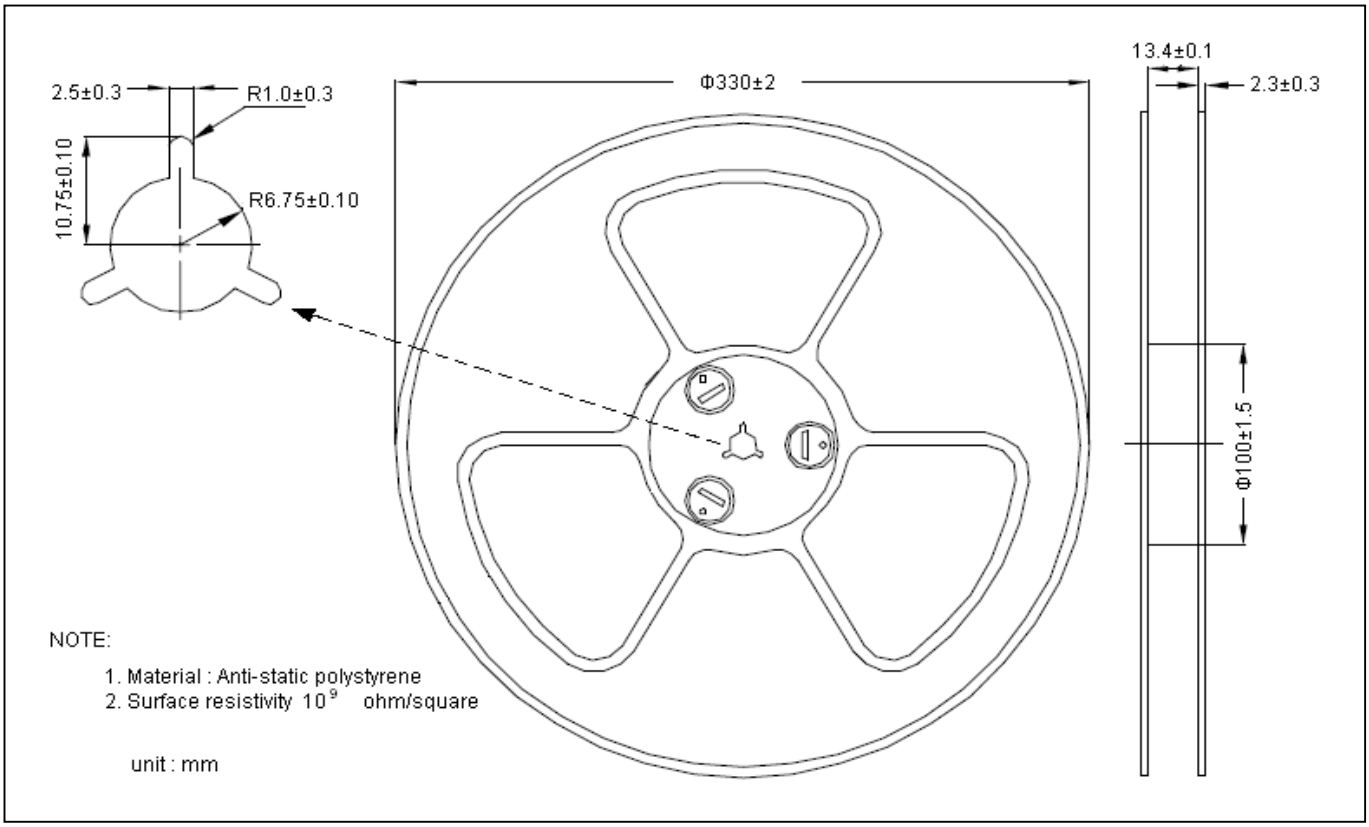
Single Pulse Power Rating, Junction to Ambient
(Note on page 2)



Transient Thermal Response Curves



Reel Dimension

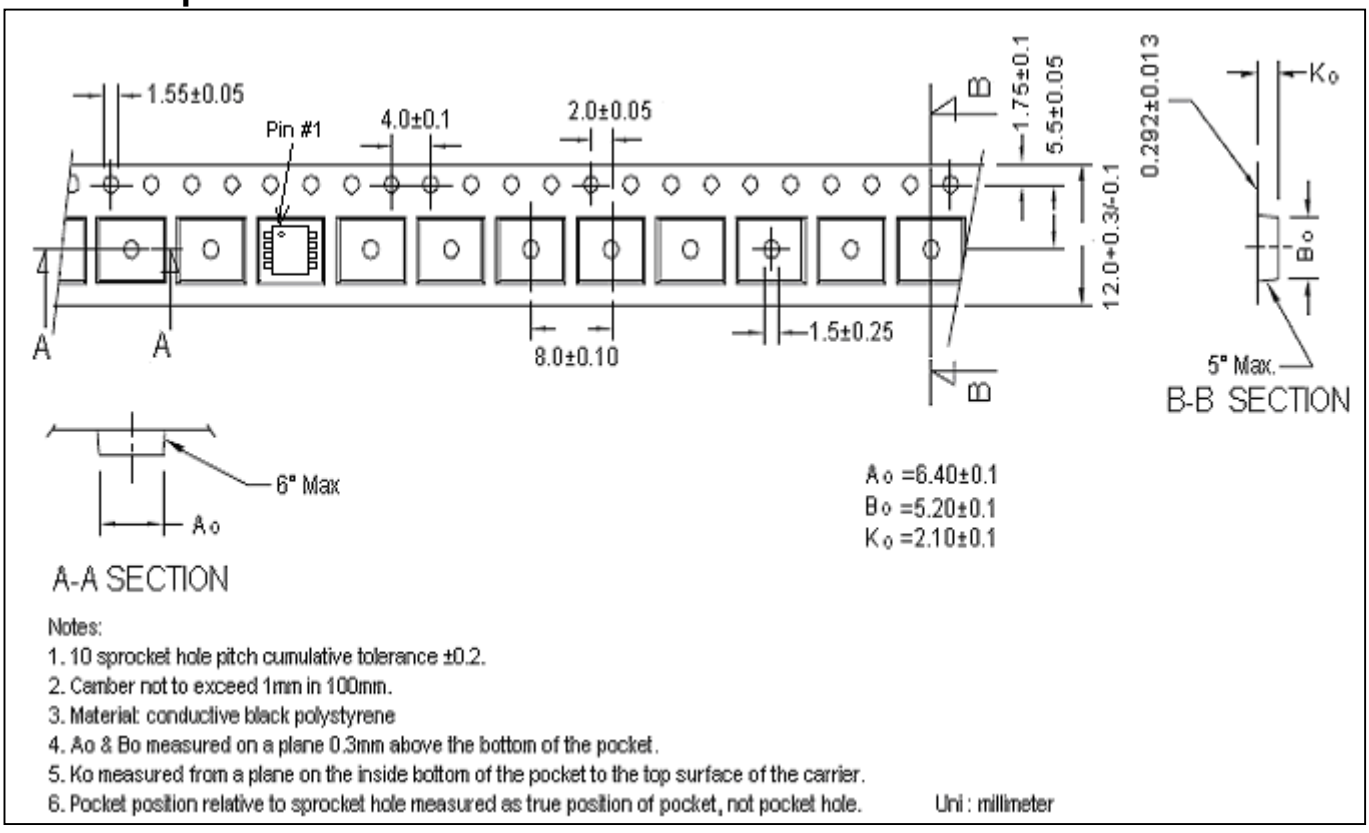


NOTE:

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

unit : mm

Carrier Tape Dimension



Notes:

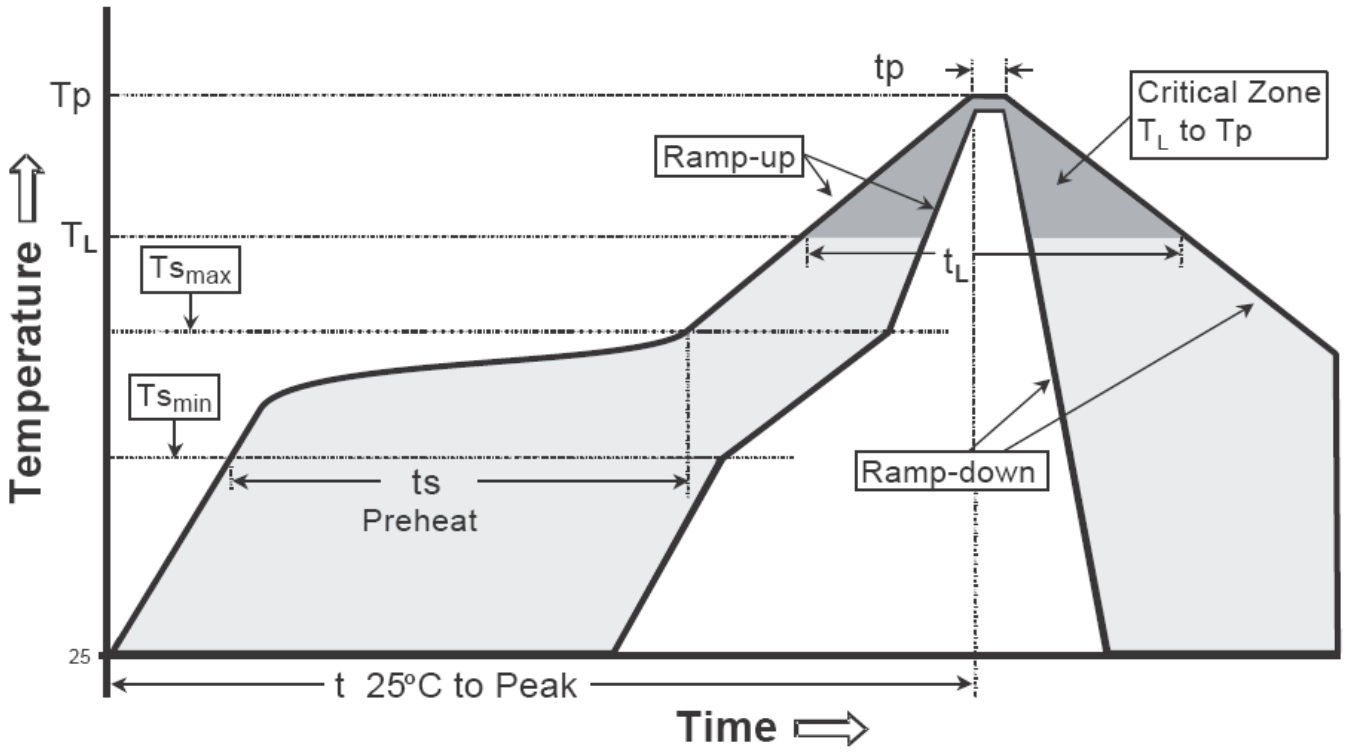
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material: conductive black polystyrene
4. Ao & Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6.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

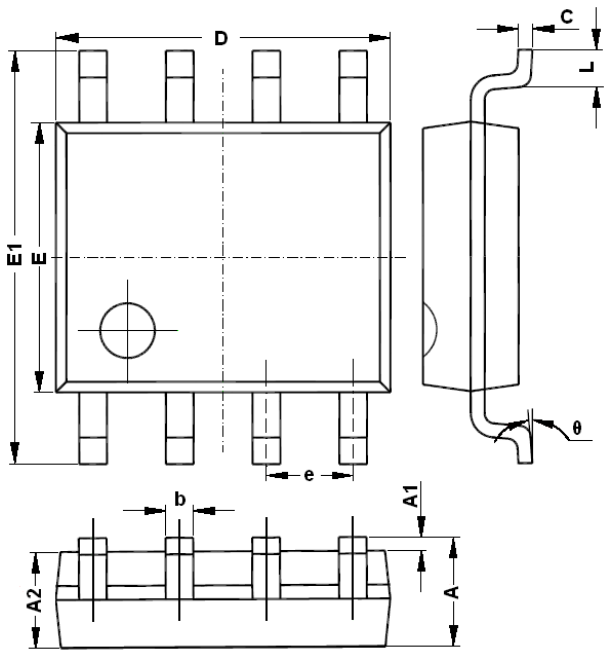
Recommended temperature profile for IR reflow

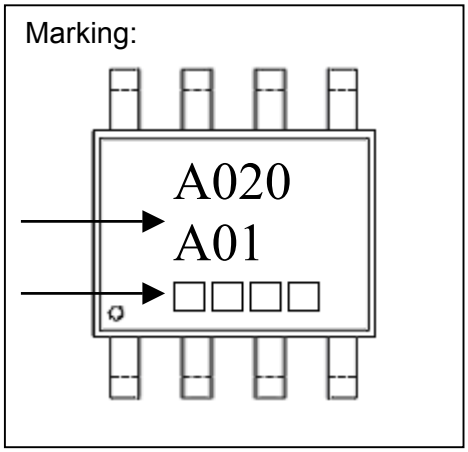


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time($t_{s\ min}$ to $t_{s\ max}$)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (T_L) − Time (t_L)	 183°C 60-150 seconds	 217°C 60-150 seconds
Peak Temperature(T_P)	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





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

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.