P-Channel Enhancement Mode Power MOSFET

MTA025P02Q8

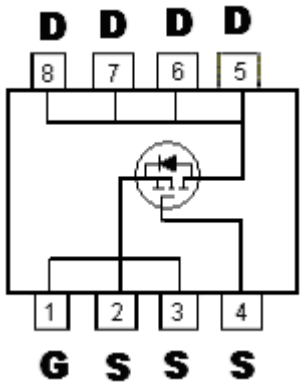
BV_{DSS}	-20V
I_D@ V_{GS}=-4.5V, T_A=25°C	-10A
R_{DSON} @V_{GS}=-4.5V, I_D=-7.6A	14.2mΩ(typ.)
R_{DSON} @V_{GS}=-2.5V, I_D=-6A	18.0mΩ(typ.)

Features

- Simple drive requirement
- Low on-resistance
- Fast switching speed
- Pb-free lead plating package

Equivalent Circuit

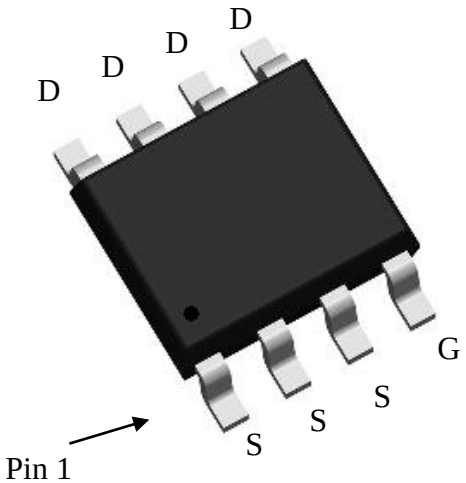
MTA025P02Q8



G：Gate S：Source D：Drain

Outline

SOP-8



Ordering Information

Device	Package	Shipping
MTA025P02Q8-0-T3-G	SOP-8 (Pb-free lead plating & 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}	-20	V
Gate-Source Voltage		V_{GS}	±8	
Continuous Drain Current @ T_A=25°C, V_{GS}=-4.5V		I_D	-10	A
Continuous Drain Current @ T_A=70°C, V_{GS}=-4.5V			-8	
Pulsed Drain Current		I_{DM}	-50 *1	
Avalanche Current @ L=0.1mH		I_{AS}	-30	
Avalanche Energy @ L=1mH, I_D=-10A, V_{DD}=-15V		E_{AS}	50 *4	mJ
Repetitive Avalanche Energy @ L=0.05mH		E_{AR}	2.5 *2	
Total Power Dissipation	T_A=25℃	P_D	3.1 *3	W
	T_A=70℃		2 *3	
Operating Junction and Storage Temperature Range		Tj, Tstg	-55~+150	°C

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{th,j-c}$	20	°C/W
Thermal Resistance, Junction-to-ambient, max	$R_{th,j-a}$	40 *3	

Note : 1. Pulse width limited by maximum junction temperature
2. Duty cycle≤1%
3. Surface mounted on 1 in² copper pad of FR-4 board, t≤10s ; 125°C/W when mounted on minimum copper pad.
4. 100% tested by conditions of L=0.1mH, I_{AS}=-8A, V_{GS}=-10V, V_{DD}=-15V

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

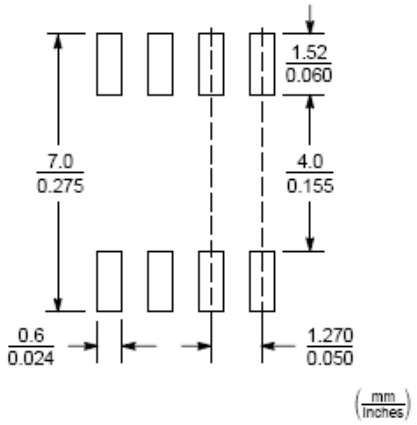
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	-20	-	-	V	V_{GS}=0V, I_D=-250μA
$V_{GS(th)}$	-0.4	-	-1.2		V_{DS}=V_{GS}, I_D=-250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±8V, V_{DS}=0V
I_{DSS}	-	-	-1	μA	V_{DS}=-16V, V_{GS}=0V
I_{DSS}	-	-	-10		V_{DS}=-16V, V_{GS}=0V, Tj=125°C
$R_{DS(ON)}$ *1	-	14.2	20	mΩ	V_{GS}=-4.5V, I_D=-7.6A
	-	18.0	30		V_{GS}=-2.5V, I_D=-6A
G_{FS} *1	-	26.5	-	S	V_{DS}=-5V, I_D=-10A
Dynamic					
Ciss	-	2453	-	pF	V_{DS}=-10V, V_{GS}=0V, f=1MHz
Coss	-	219	-		
Crss	-	165	-		

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(ON)}$ *1, 2	-	12.6	25	ns	V_{DD}=-10V, I_D=-7.6A, V_{GS}=-4.5V, R_G=6Ω
tr *1, 2	-	11	22		
$t_{d(OFF)}$ *1, 2	-	113.4	170		
t_f *1, 2	-	145.8	220		
Qg *1, 2	-	24.9	35	nC	V_{DS}=-10V, I_D=-7.6A, V_{GS}=-4.5V
Qgs *1, 2	-	3.5	-		
Qgd *1, 2	-	5.4	-		
Rg	-	18	-	Ω	f=1MHz
Source-Drain Diode					
I_S *1	-	-	-4	A	
I_{SM} *3	-	-	-16		
V_{SD} *1	-	-0.75	-1.2	V	I_S=-2A, V_{GS}=0V
trr	-	53.8	-	ns	I_F=-2A, dI_F/dt=100A/μs
Qrr	-	34.8	-	nC	

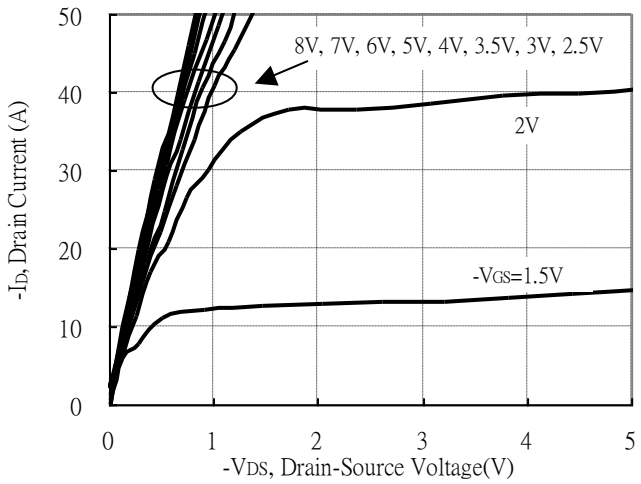
Note : *1.Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%
*2.Independent of operating temperature
*3.Pulse width limited by maximum junction temperature.

Recommended Soldering Footprint

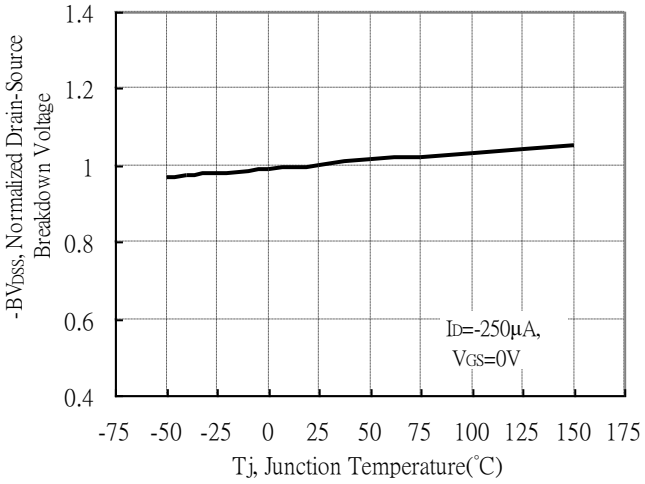


Typical Characteristics

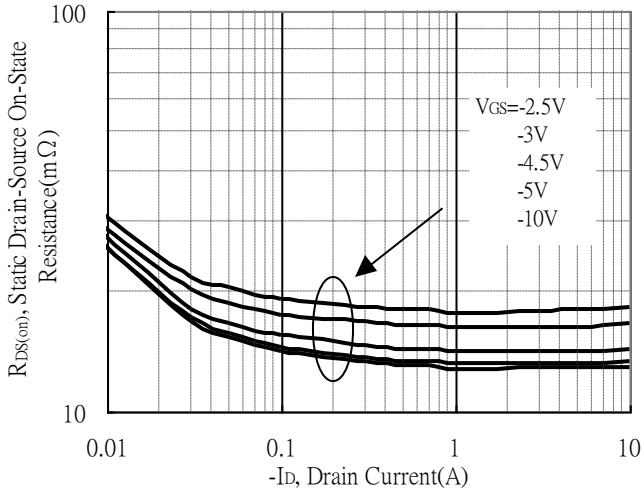
Typical Output Characteristics



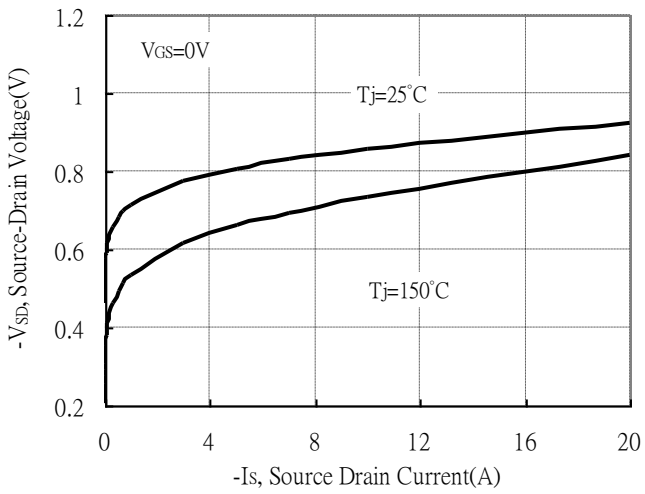
Brekdown Voltage vs Ambient Temperature



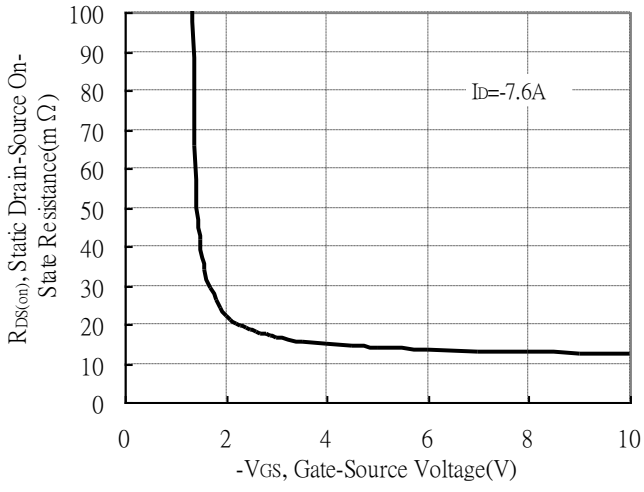
Static Drain-Source On-State resistance vs Drain Current



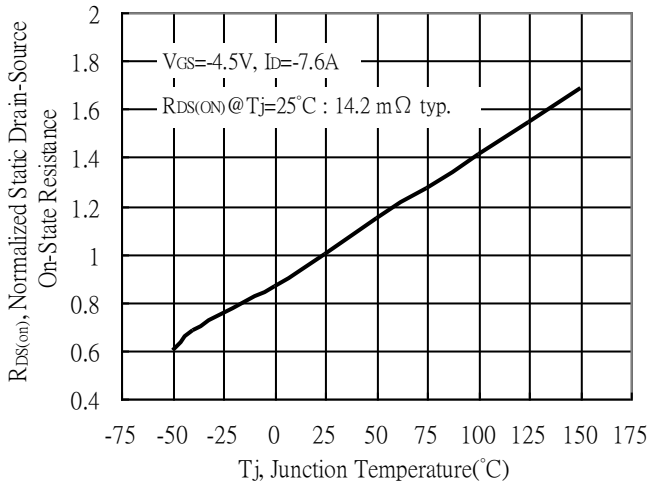
Source Drain Current vs Source-Drain Voltage



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

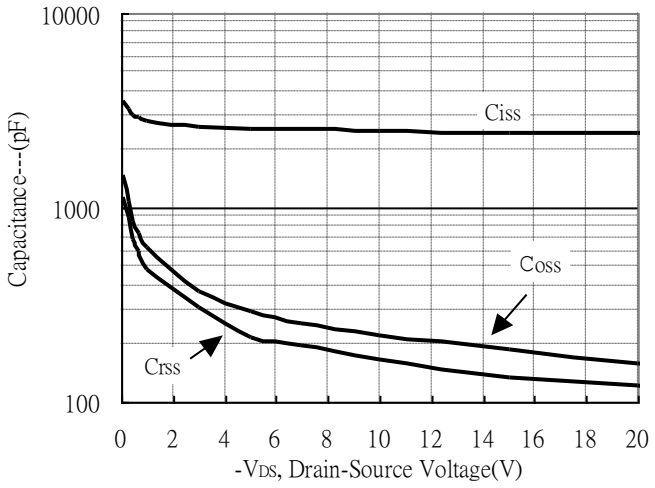


Drain-Source On-State Resistance vs Junction Tempearture

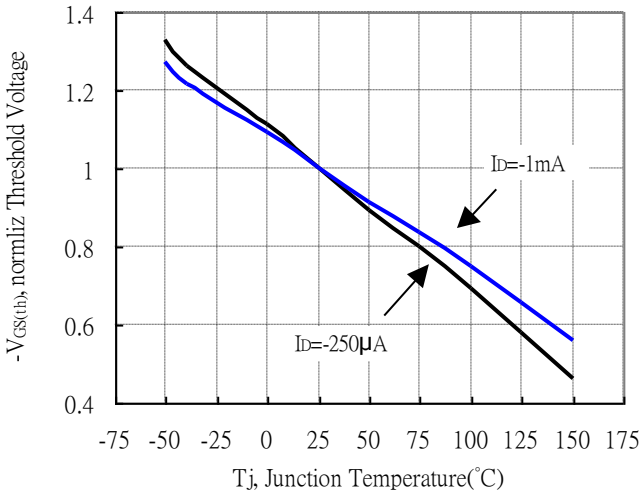


Typical Characteristics(Cont.)

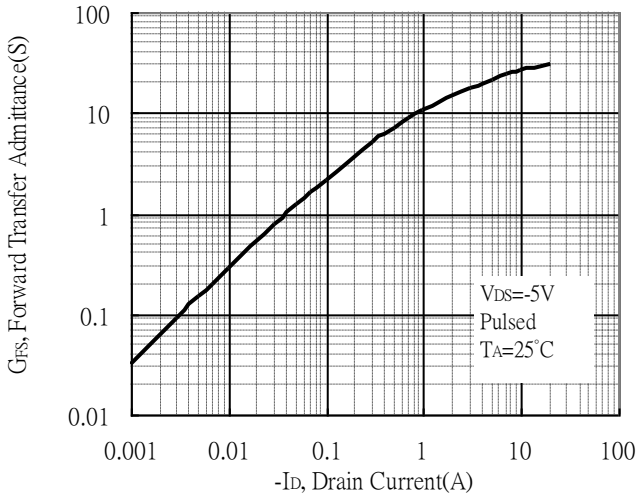
Capacitance vs Drain-to-Source Voltage



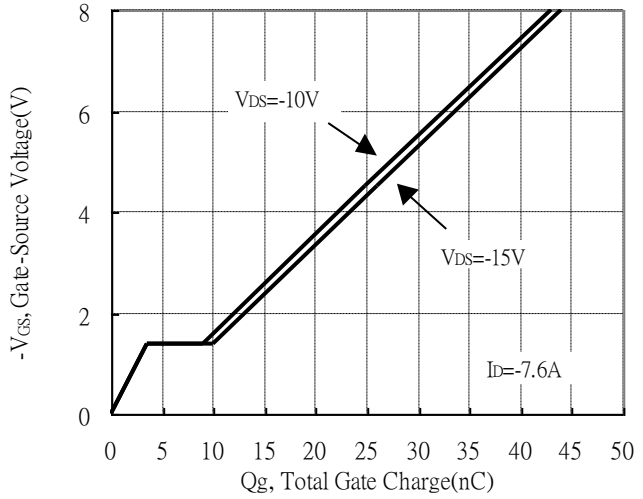
Threshold Voltage vs Junction Tempearture



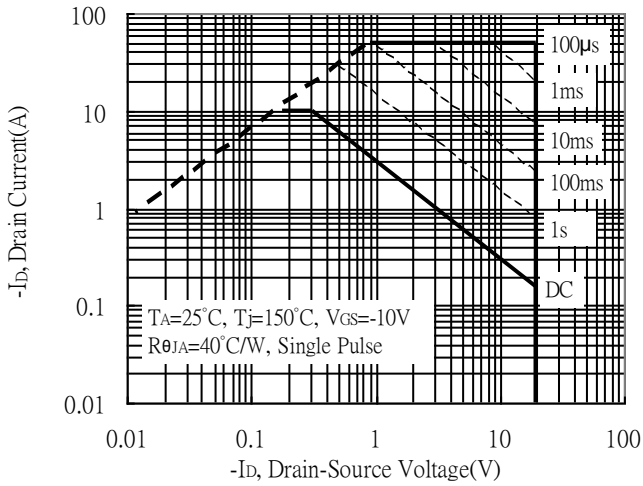
Forward Transfer Admittance vs Drain Current



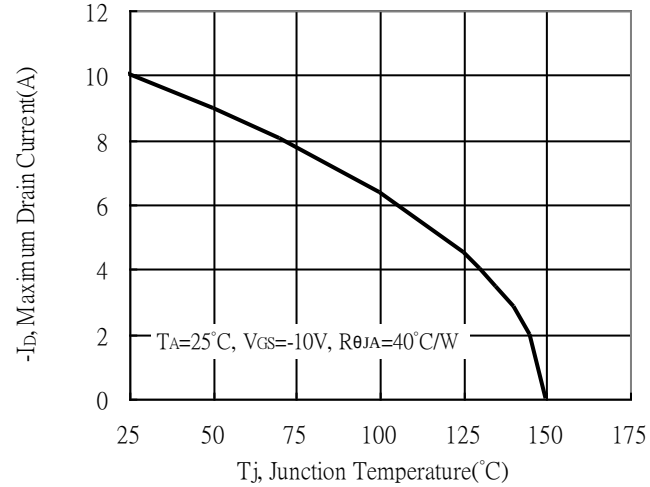
Gate Charge Characteristics



Maximum Safe Operating Area

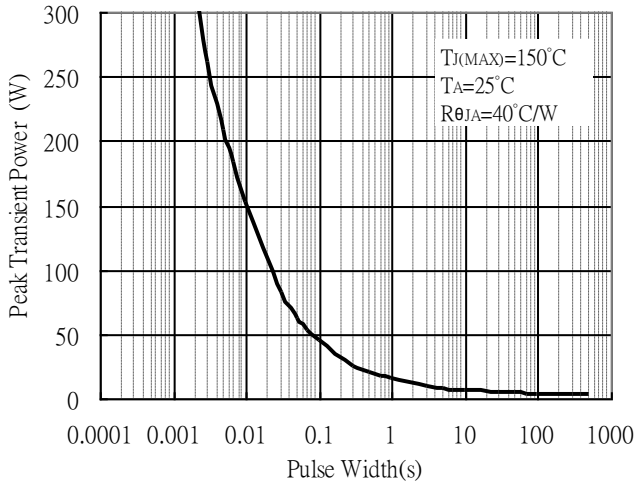


Maximum Drain Current vs Junction Temperature

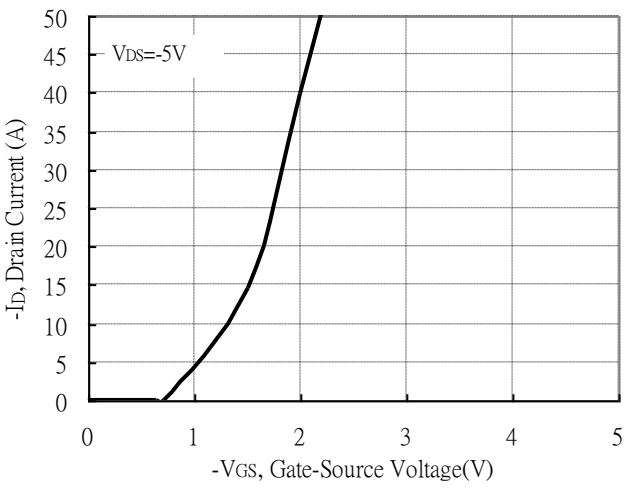


Typical Characteristics(Cont.)

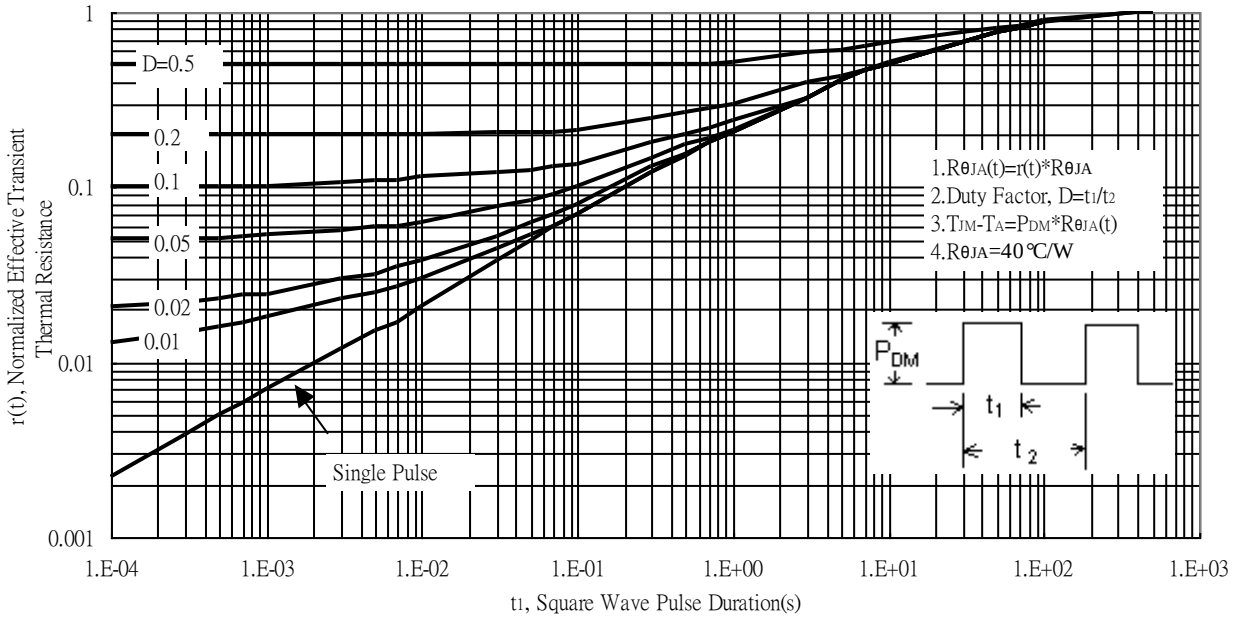
Single Pulse Maximum Power Dissipation



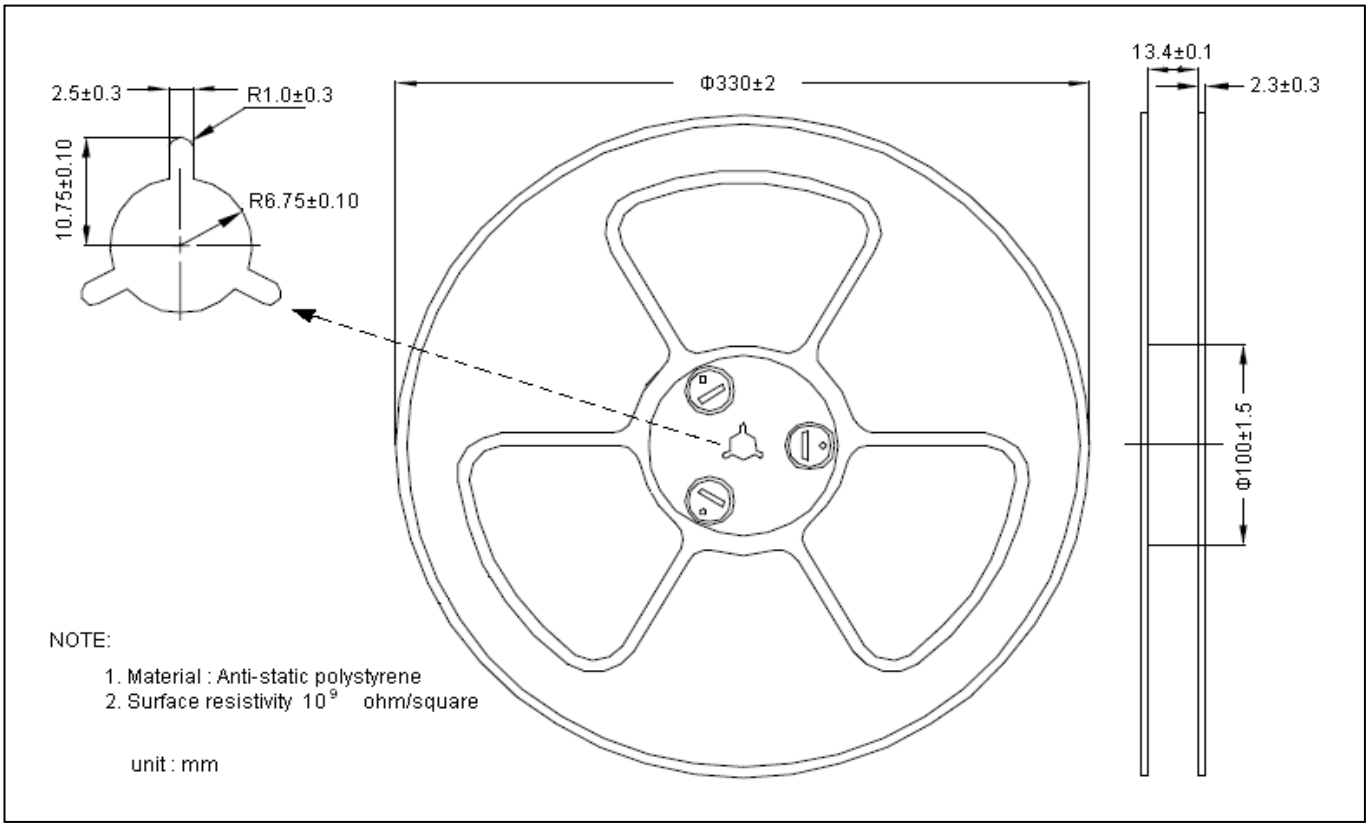
Typical Transfer Characteristics



Transient Thermal Response Curves



Reel Dimension

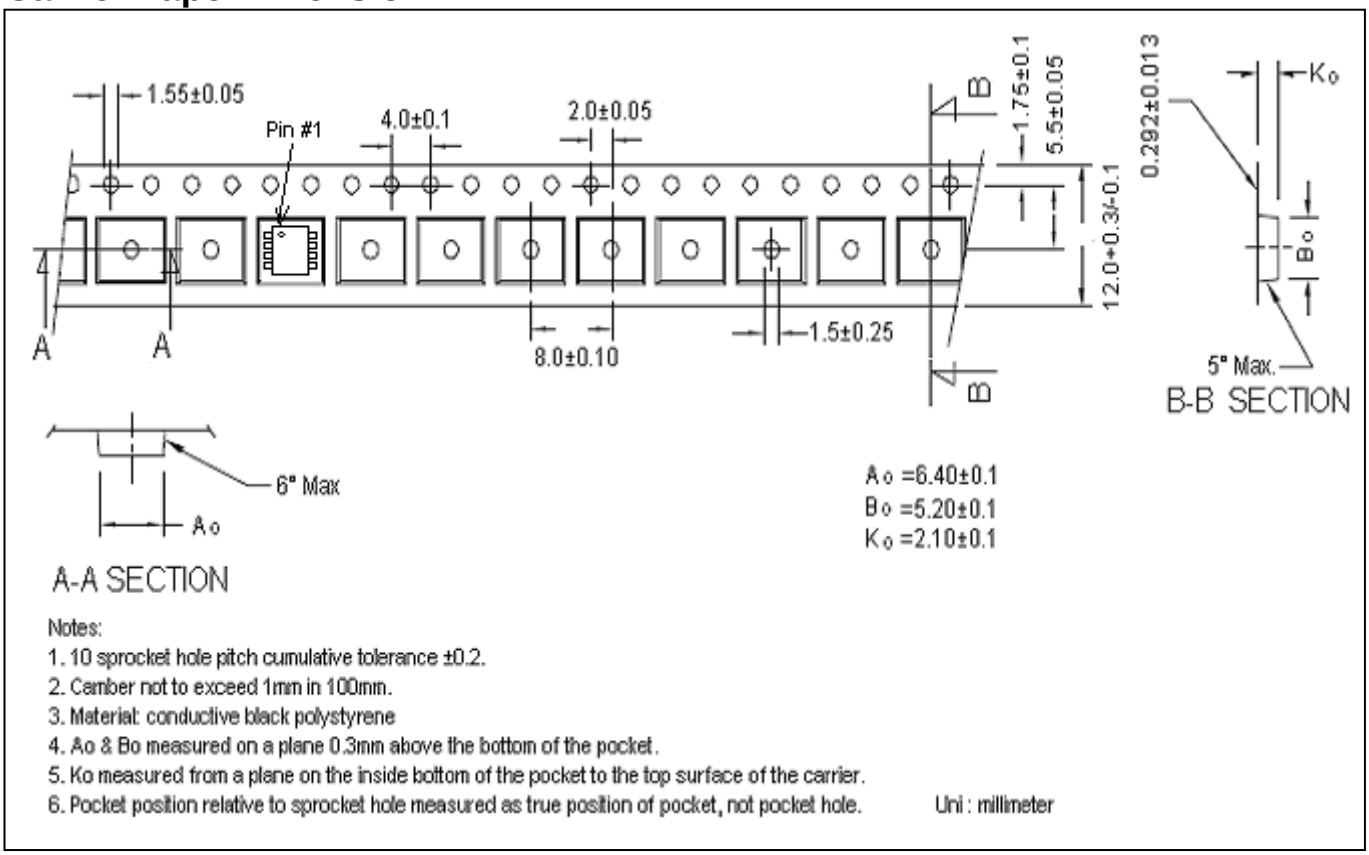


NOTE:

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:

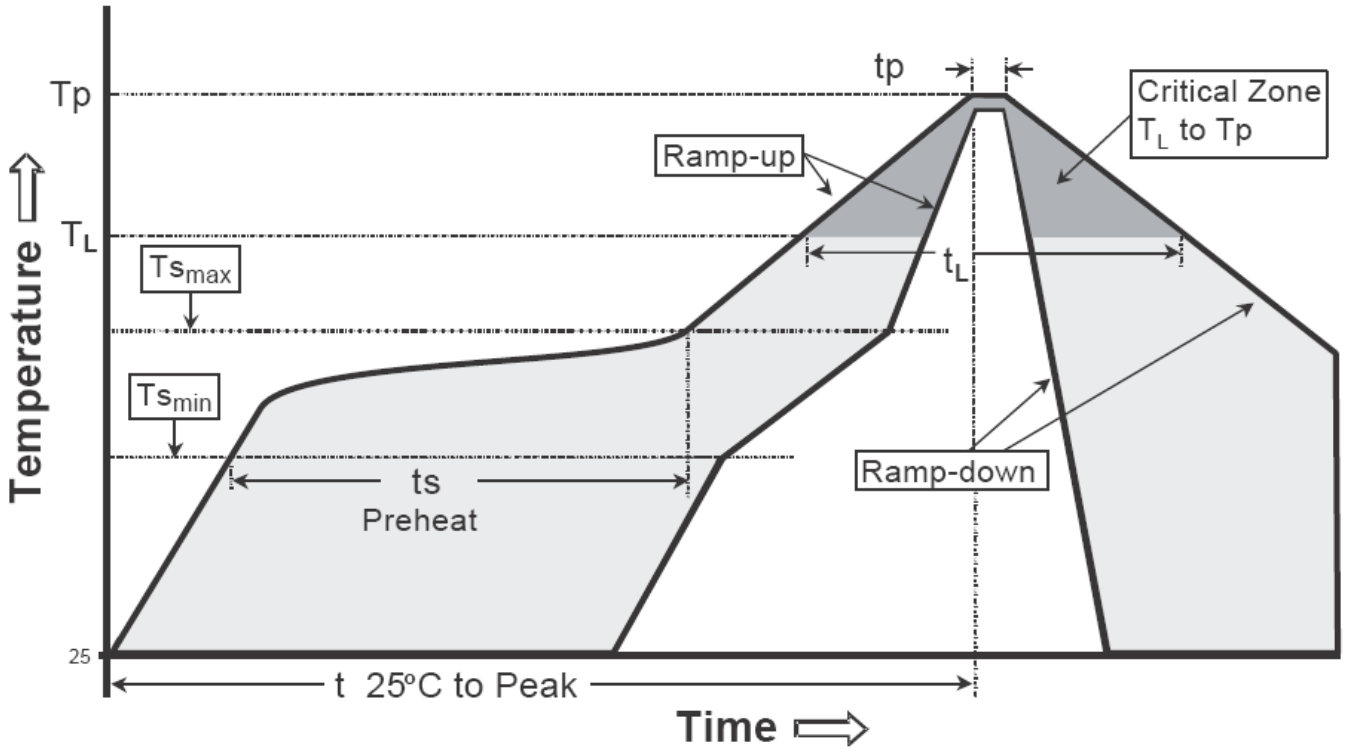
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material: conductive black polystyrene
4. Ao & Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6.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

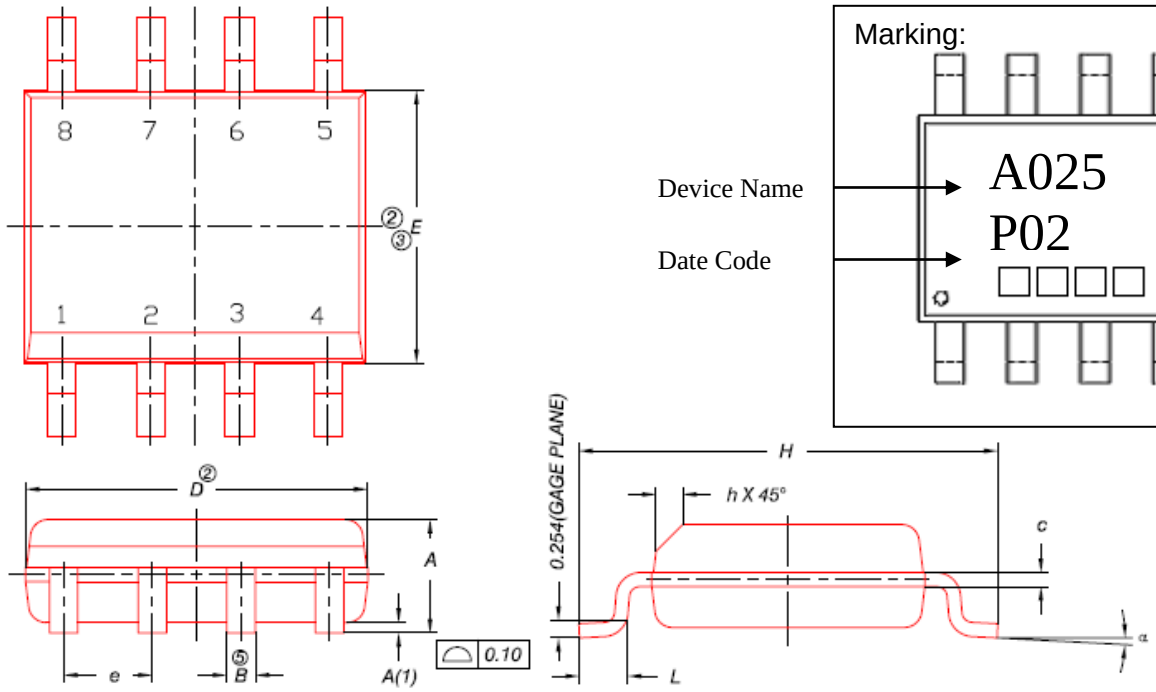
Recommended temperature profile for IR reflow

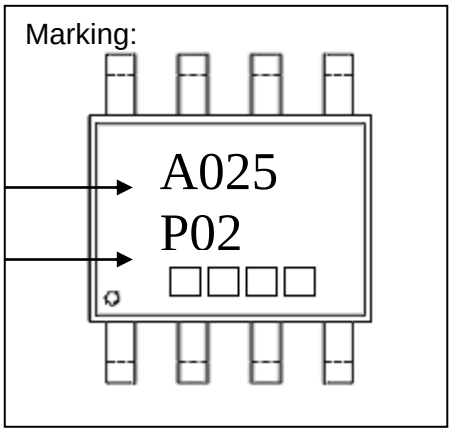


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(Ts min) −Temperature Max(Ts max) −Time(ts min to ts max)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (TL)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





Note:
1. All Dimension Are In mm.
② Package Body Sizes Exclude Mold Flash, Protrusion Or Gate Burrs.
Mold Flash, Protrusion Or Gate Burrs Shall Not Exceed 0.10 mm Per Side.
③ Package Body Sizes Determined At The Outermost Extremes Of The Plastic Body Exclusive Of Mold Flash, Tie Bar Burrs, Gate Burrs And Interlead Flash, But Including Any Mismatch Between The Top And Bottom Of The Plastic Body.
4. The Package Top May Be Smaller Than The Package Bottom.
⑤ Dimension "B" Does Not Include Dambar Protrusion. Allowable Dambar Protrusion Shall Be 0.08 mm Total In Excess Of "B" Dimension At Maximum Material Condition. The Dambar Cannot Be Located On The Lower Radius Of The Foot.

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	1.35	1.75	0.053	0.069	e	1.270 (BSC)		0.050 (BSC)	
A(1)	0.10	0.25	0.004	0.010	H	5.80	6.20	0.228	0.244
B	0.38	0.51	0.015	0.020	L	0.50	0.93	0.020	0.037
C	0.19	0.25	0.007	0.010	α	0	8°	0	8°
D	4.80	5.00	0.189	0.197	h	0.25	0.50	0.010	0.020
E	3.80	4.00	0.150	0.157					

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.