N- and P-Channel Logic Level Enhancement Mode MOSFET

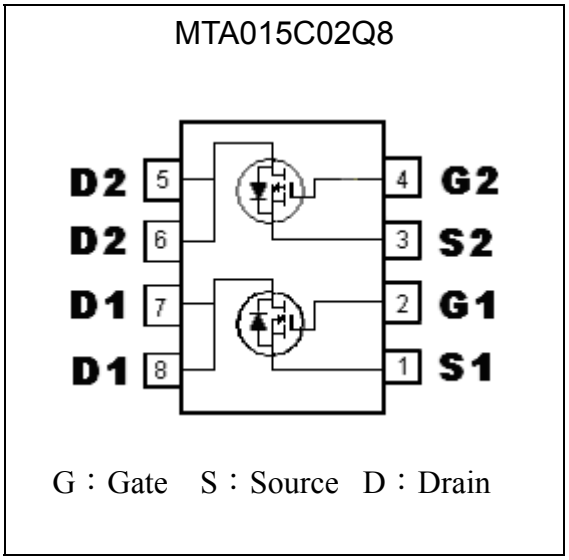
MTA015C02Q8

	N-CH	P-CH
BV_{DSS}	20V	-20V
I_D@ T_A=25 °C, V_{GS}=4.5V(-4.5V)	8.5A	-5A
R_{DSON}(typ.) @V_{GS}=(-)4.5V	14.3mΩ	50.3mΩ
R_{DSON}(typ.) @V_{GS}=(-)2.5V	19mΩ	66.6mΩ

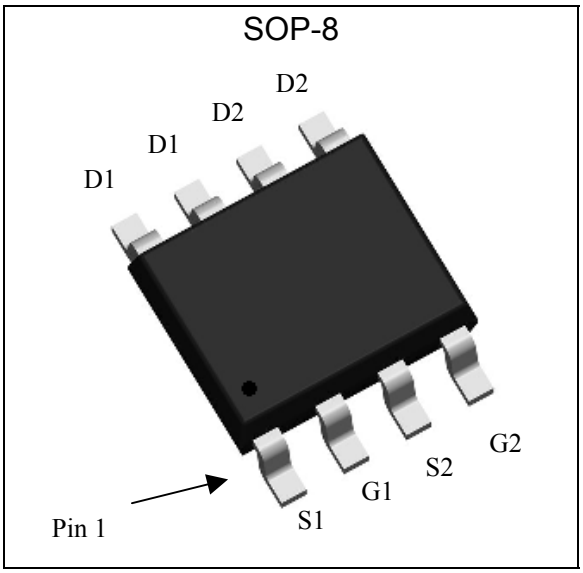
Features

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

Equivalent Circuit



Outline



Ordering Information

Device	Package	Shipping
MTA015C02Q8-0-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 (Tc=25°C, unless otherwise noted)

Parameter		Symbol	Limits		Unit
			N-channel	P-channel	
Drain-Source Breakdown Voltage		BVDSS	20	-20	V
Gate-Source Voltage		VGS	±8	±8	V
Continuous Drain Current (Note 2)	TA=25 °C, VGS=4.5V (-4.5V)	ID	8.5	-5	A
	TA=70 °C, VGS=4.5V (-4.5V)		6.8	-4	A
Pulsed Drain Current (Note 1)		IDM	40	-30	A
Power Dissipation (Note 2)	TA=25°C	PD	2.5		W
	TA=70°C		1.6		W
Operating Junction and Storage Temperature Range		Tj; Tstg	-55~+150		°C

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	RθJC	25	°C/W
Thermal Resistance, Junction-to-ambient, max	RθJA	50 (Note 2)	°C/W
Lead Temperature(1/16" from case, for 10 seconds)	TL	275	°C

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

N-Channel Electrical Characteristics (Tc=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BVDSS	20	-	-	V	VGS=0V, ID=250μA
VGS(th)	0.5	-	1.3	V	VDS=VGS, ID=250μA
IGSS	-	-	±100	nA	VGS=±8V, VDS=0V
IDSS	-	-	1	μA	VDS=18V, VGS=0V
	-	-	25	μA	VDS=18V, VGS=0V, Tj=125°C
*RDS(ON)	-	14.3	20	mΩ	VGS=4.5V, ID=8A
	-	19	40	mΩ	VGS=2.5V, ID=5.2A
*GFS	-	7.6	-	S	VDS=10V, ID=3A
Dynamic					
Ciss	-	804	1045	pF	VDS=10V, VGS=0V, f=1MHz
Coss	-	99	135	pF	
Crss	-	87	115	pF	
*td(ON)	-	8.8	18	ns	VDS=10V, ID=1A, VGS=4.5V, RG=10Ω
*tr	-	21.8	44	ns	
*td(OFF)	-	59.4	120	ns	
*tf	-	27	54	ns	
*Qg	-	10	15	nC	VDS=10V, ID=5A, VGS=4.5V
*Qgs	-	1.3	2.6	nC	
*Qgd	-	2.9	6	nC	

Rg	-	1.2	2.4	Ω	f=1MHz
Body Diode					
*I_S	-	-	1.9	A	
*I_{SM}	-	-	7.6		
*V_{SD}	-	0.82	1.2	V	V_{GS}=0V, I_S=2.5A
*Qrr	-	8.3	-	nC	I_F=1A, dI_F/dt=100A/μs
*trr	-	3.1	-	ns	

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

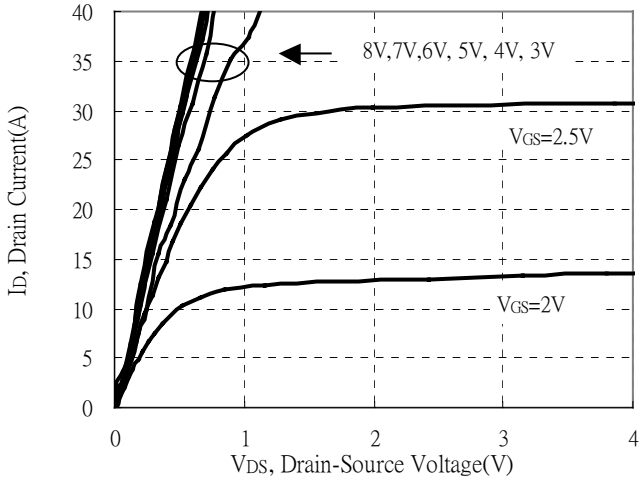
P-Channel Electrical Characteristics (Tc=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	-20	-	-	V	V_{GS}=0V, I_D=-250μA
$V_{GS(th)}$	-0.5	-	-1.3		V_{DS}=V_{GS}, I_D=-250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±8V, V_{DS}=0V
I_{DSS}	-	-	-1	μA	V_{DS}=-18V, V_{GS}=0V
	-	-	-25		V_{DS}=-18V, V_{GS}=0V, Tj=125°C
*$R_{DS(ON)}$	-	50.3	72	mΩ	V_{GS}=-4.5V, I_D=-4.3A
	-	66.6	135		V_{GS}=-2.5V, I_D=-2A
*G_{FS}	-	6.3	-	S	V_{DS}=-10V, I_D=-3A
Dynamic					
Ciss	-	679	890	pF	V_{DS}=-10V, V_{GS}=0V, f=1MHz
Coss	-	59	80		
Crss	-	56	75		
*$td_{(ON)}$	-	10.2	21	ns	V_{DS}=-10V, I_D=-1A, V_{GS}=-4.5V, R_G=10Ω
*tr	-	19.2	40		
*$td_{(OFF)}$	-	71.4	130		
*tf	-	24.6	45		
*Qg	-	7.8	12	nC	V_{DS}=-10V, I_D=-5A, V_{GS}=-4.5V
*Qgs	-	1.3	2.6		
*Qgd	-	1.7	3.4		
Rg	-	13.9	20	Ω	f=1MHz
Body Diode					
*I_S	-	-	-1.9	A	
*I_{SM}	-	-	-7.6		
*V_{SD}	-	-0.86	-1.2	V	V_{GS}=0V, I_S=-2A
*Qrr	-	7.2	-	nC	I_F=-1A, dI_F/dt=100A/μs
*trr	-	3.4	-	ns	

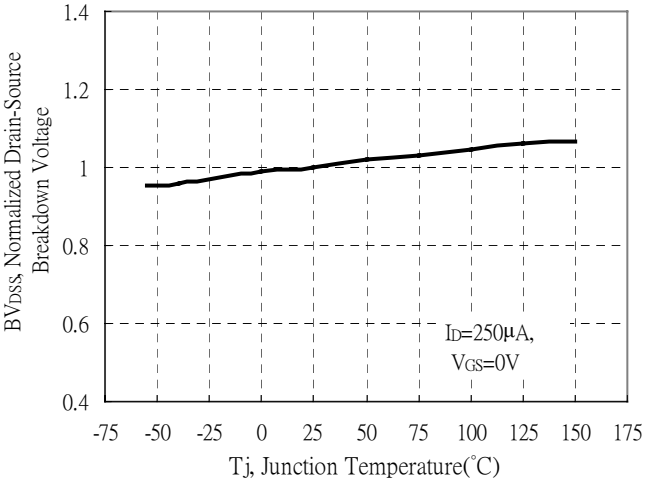
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

Typical Characteristics : Q1(N-channel)

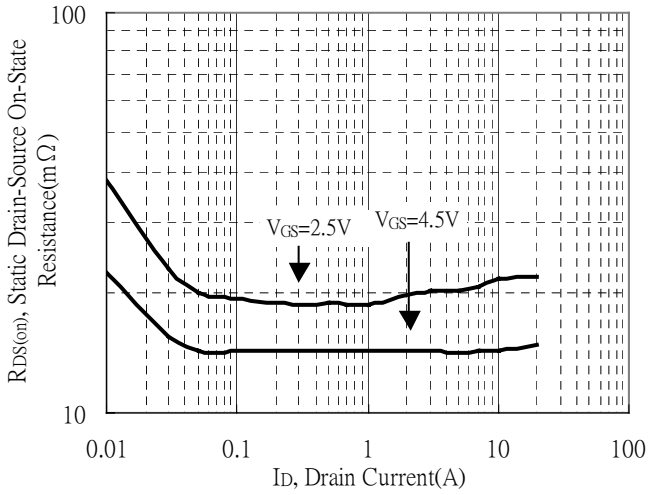
Typical Output Characteristics



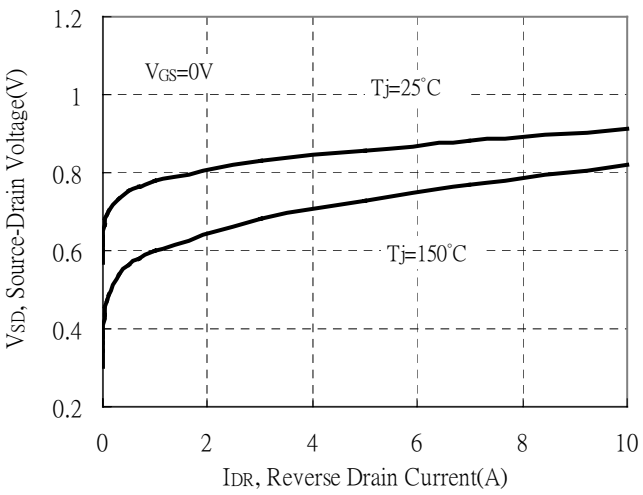
Brekdown Voltage vs Ambient Temperature



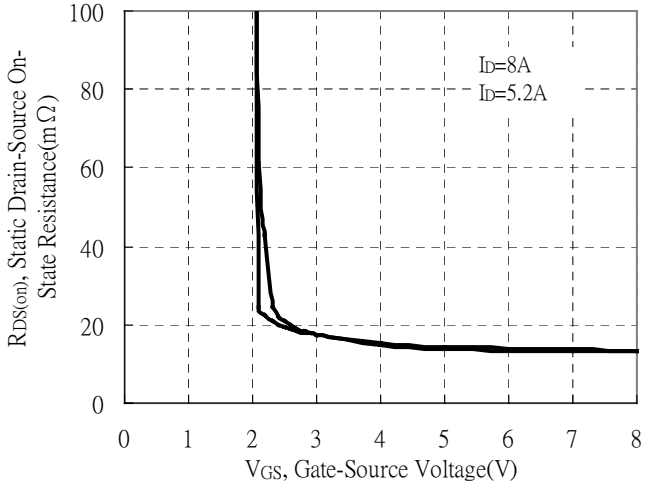
Static Drain-Source On-State resistance vs Drain Current



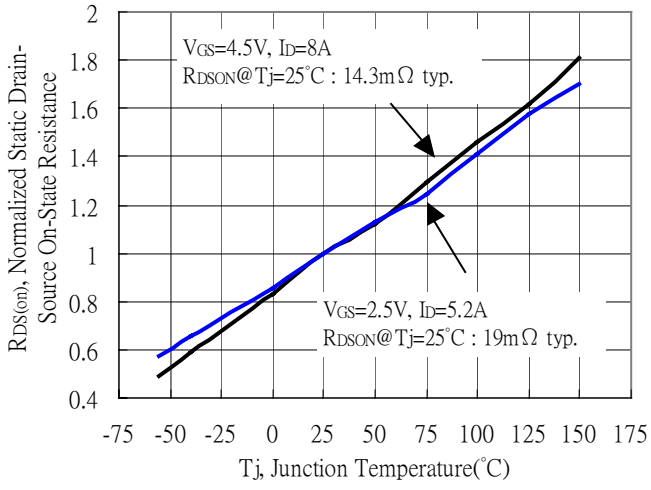
Reverse Drain Current vs Source-Drain Voltage



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

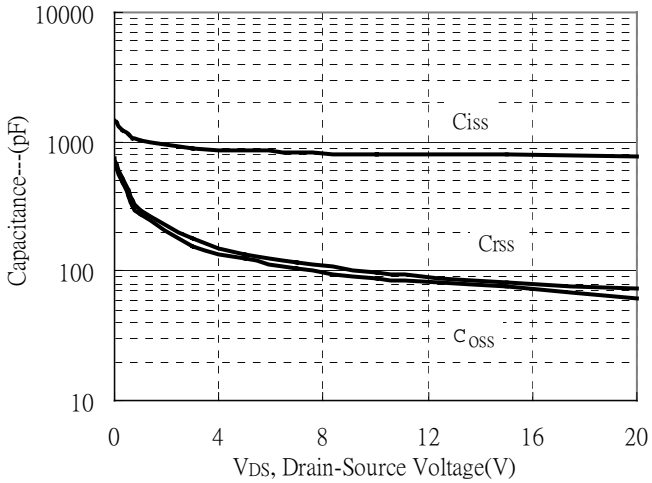


Drain-Source On-State Resistance vs Junction Tempearture

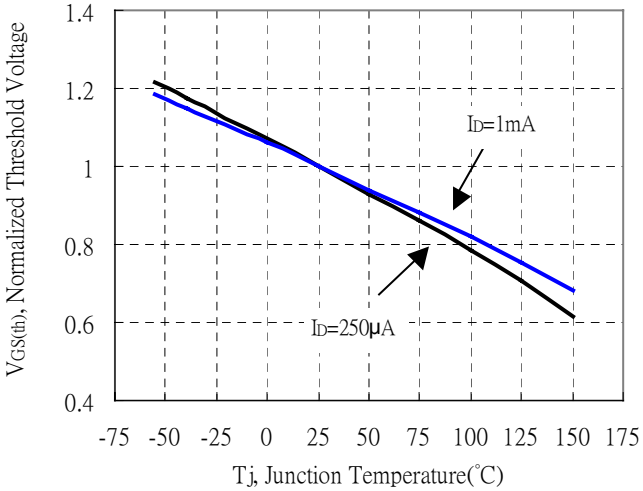


Typical Characteristics(Cont.) : Q1(N-channel)

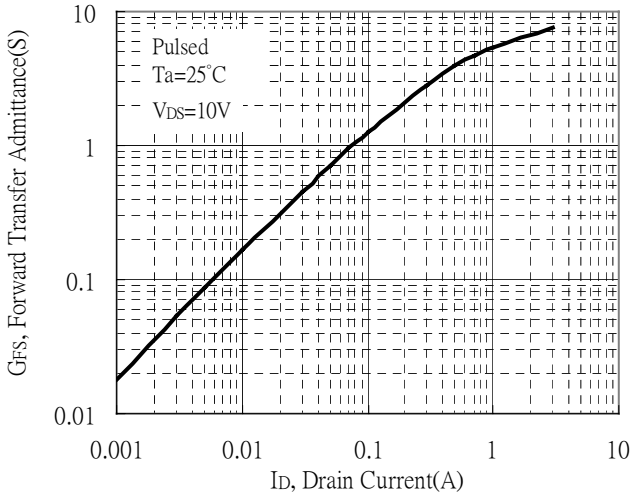
Capacitance vs Drain-to-Source Voltage



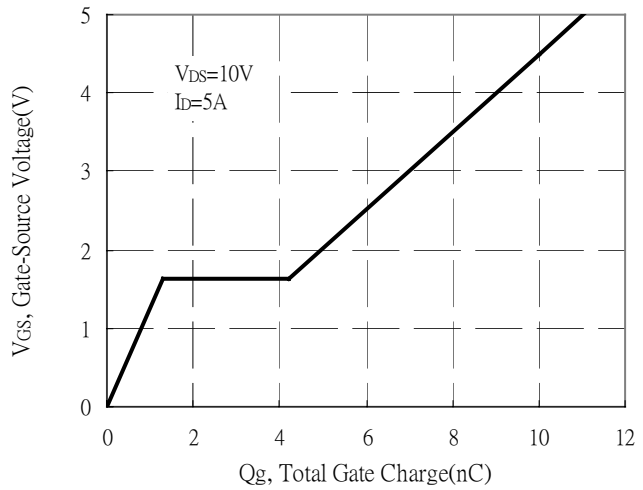
Threshold Voltage vs Junction Tempearture



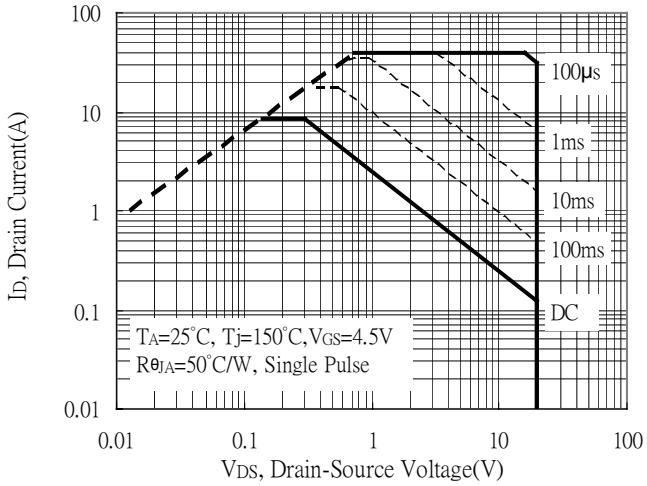
Forward Transfer Admittance vs Drain Current



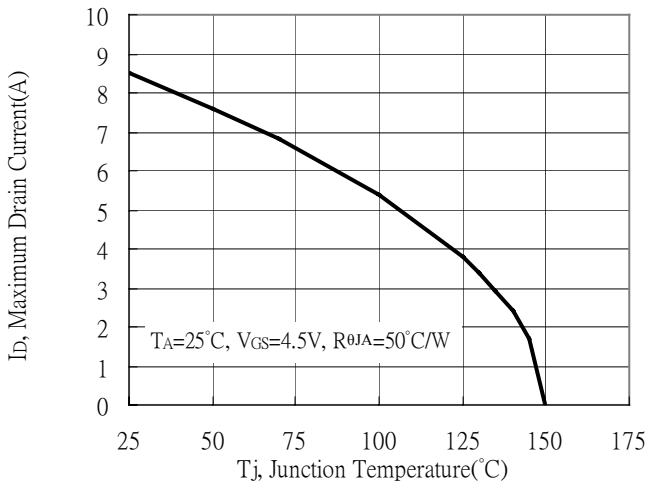
Gate Charge Characteristics



Maximum Safe Operating Area

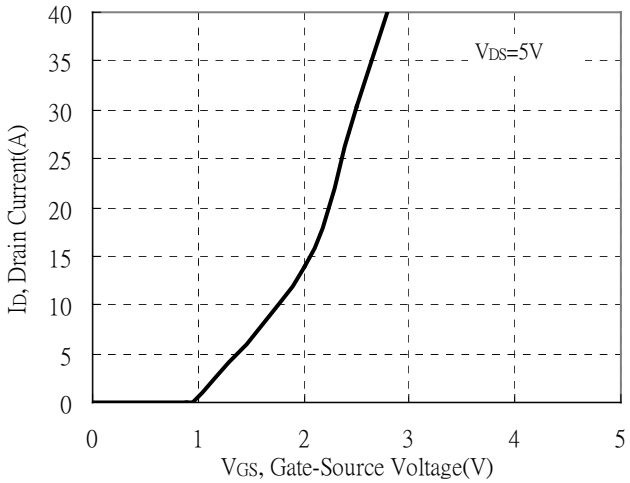


Maximum Drain Current vs JunctionTemperature

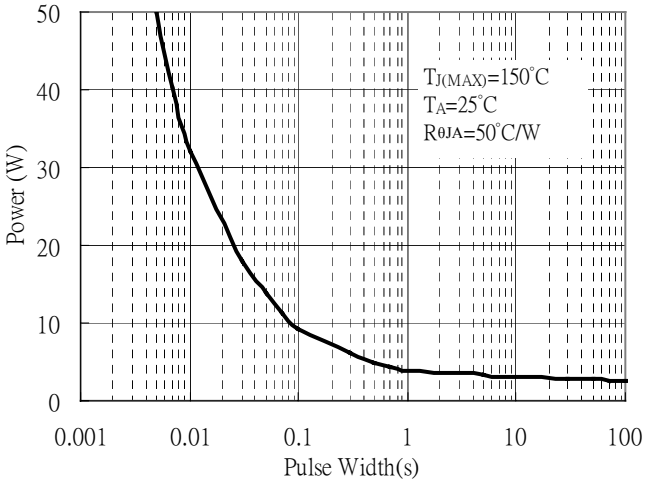


Typical Characteristics(Cont.) : Q1(N-channel)

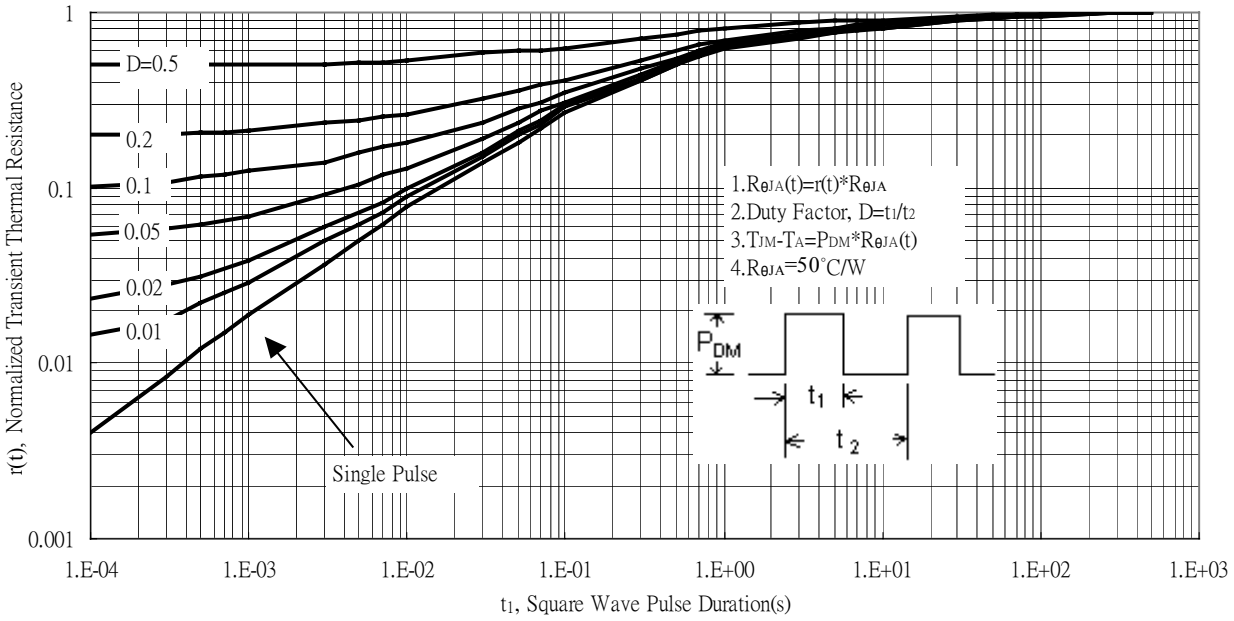
Typical Transfer Characteristics



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

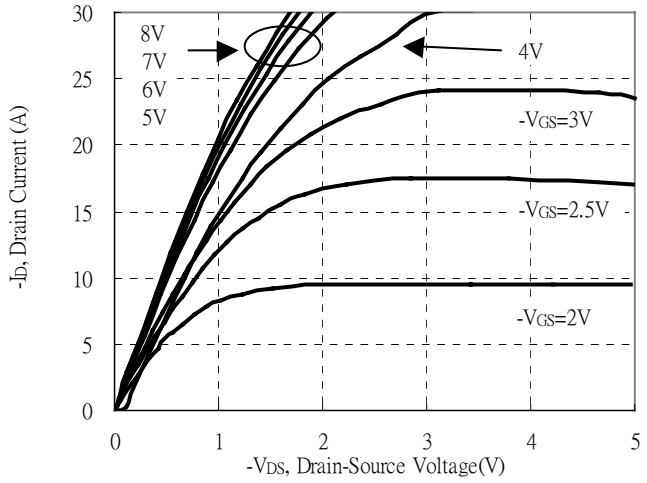


Transient Thermal Response Curves

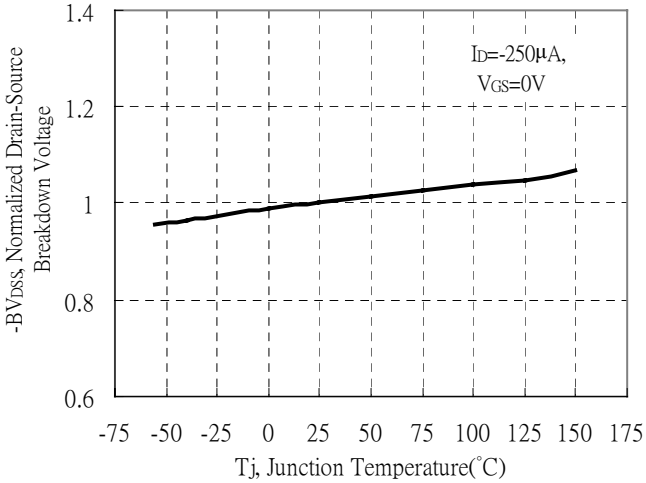


Typical Characteristics : Q2(P-channel)

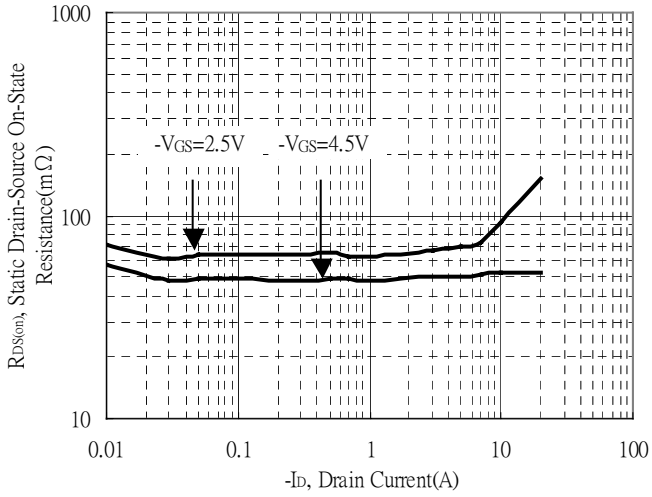
Typical Output Characteristics



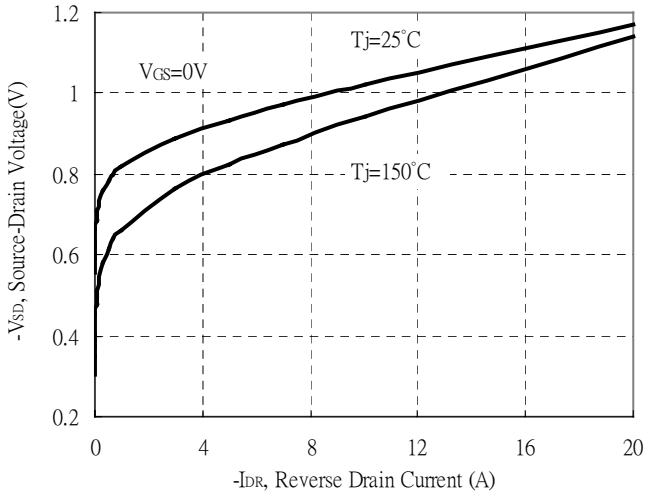
Brekdown Voltage vs Ambient Temperature



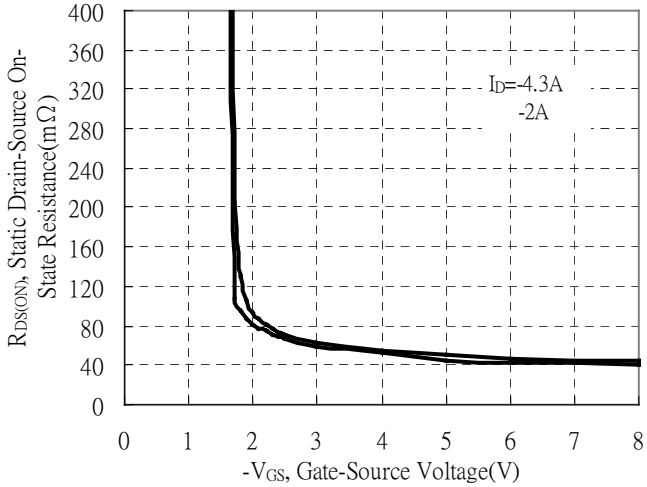
Static Drain-Source On-State resistance vs Drain Current



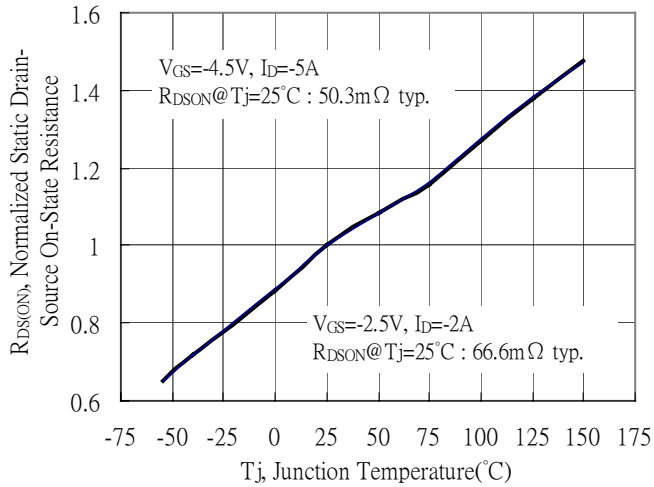
Reverse Drain Current vs Source-Drain Voltage



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

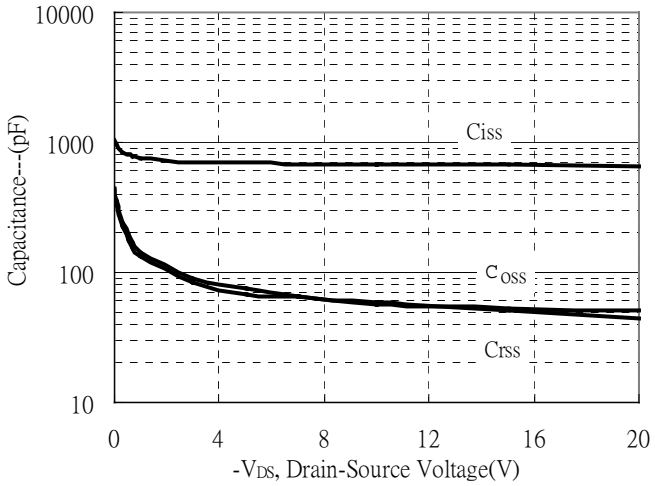


Drain-Source On-State Resistance vs Junction Tempearture

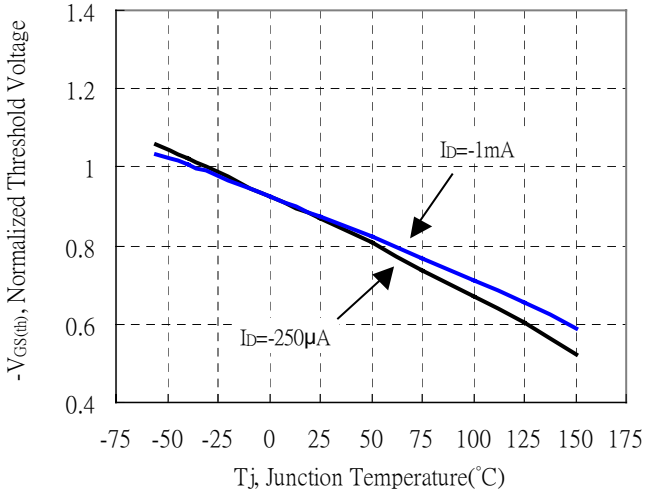


Typical Characteristics(Cont.) : Q2(P-channel)

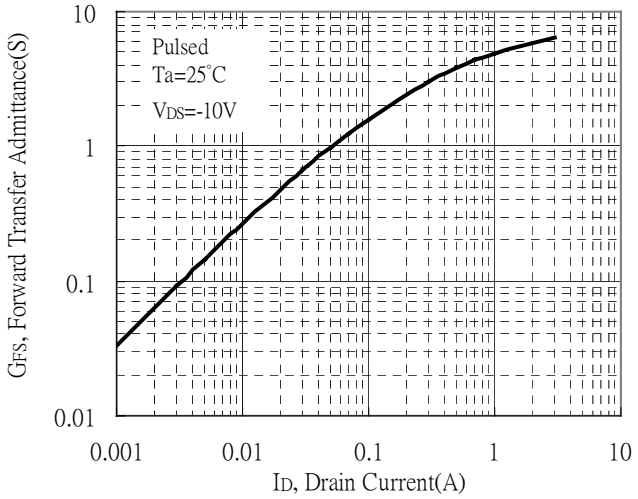
Capacitance vs Drain-to-Source Voltage



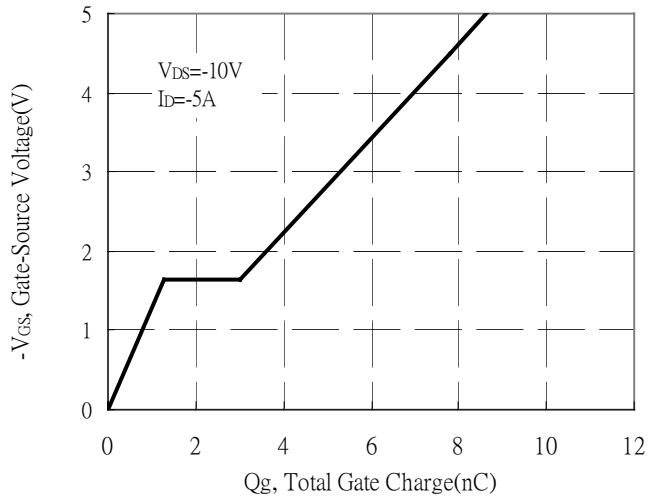
Threshold Voltage vs Junction Tempearture



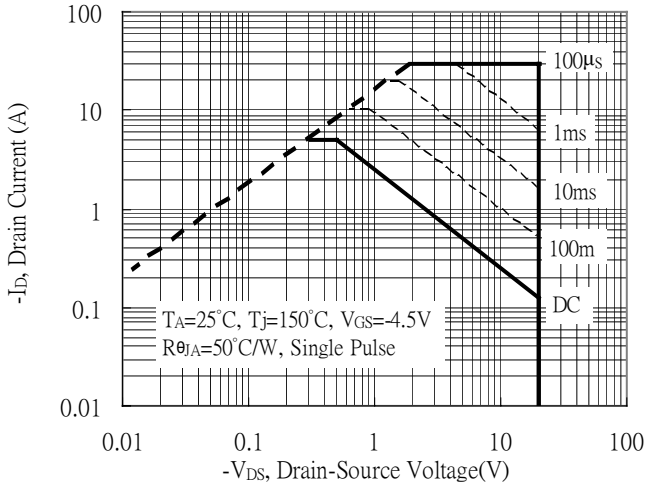
Forward Transfer Admittance vs Drain Current



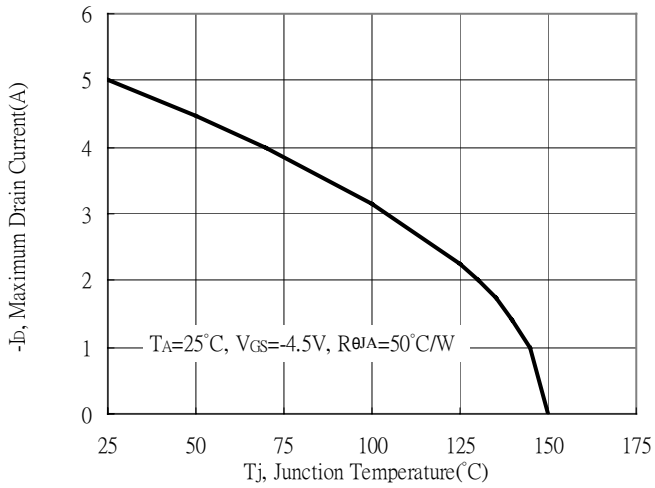
Gate Charge Characteristics



Maximum Safe Operating Area

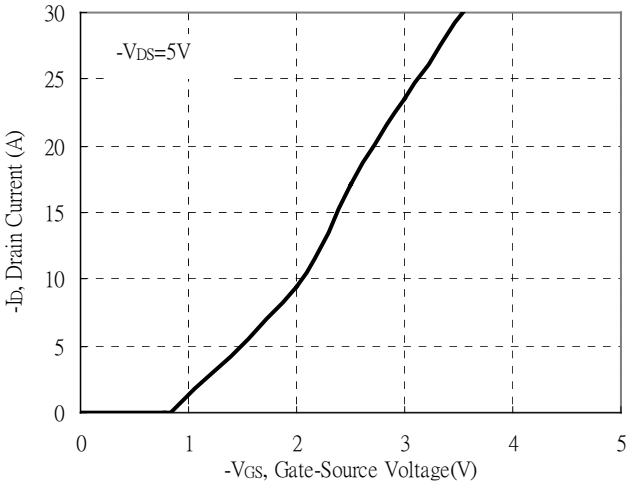


Maximum Drain Current vs JunctionTemperature

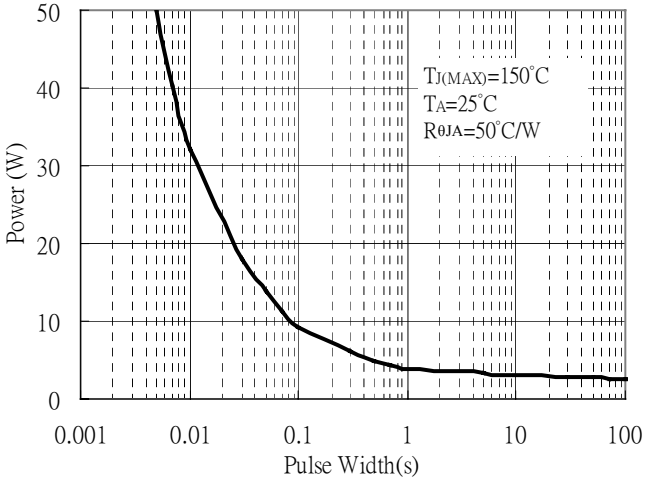


Typical Characteristics(Cont.) : Q2(P-channel)

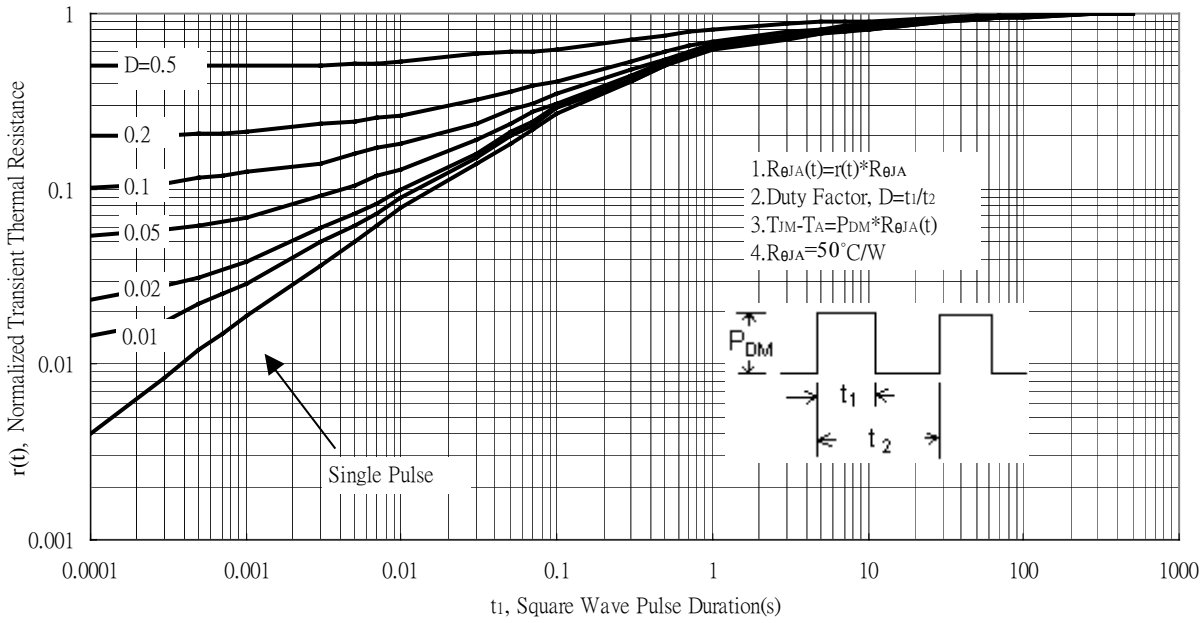
Typical Transfer Characteristics



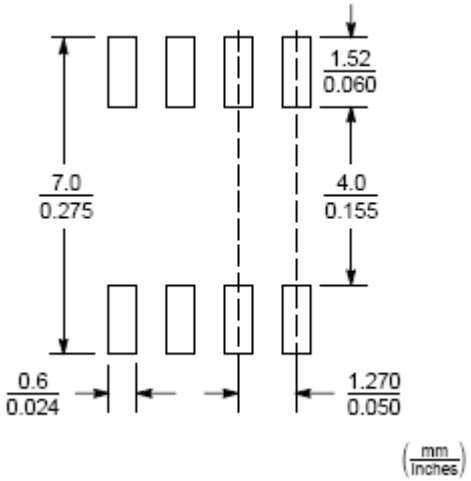
Single Pulse Power Rating, Junction to Ambient
(Note on page 2)



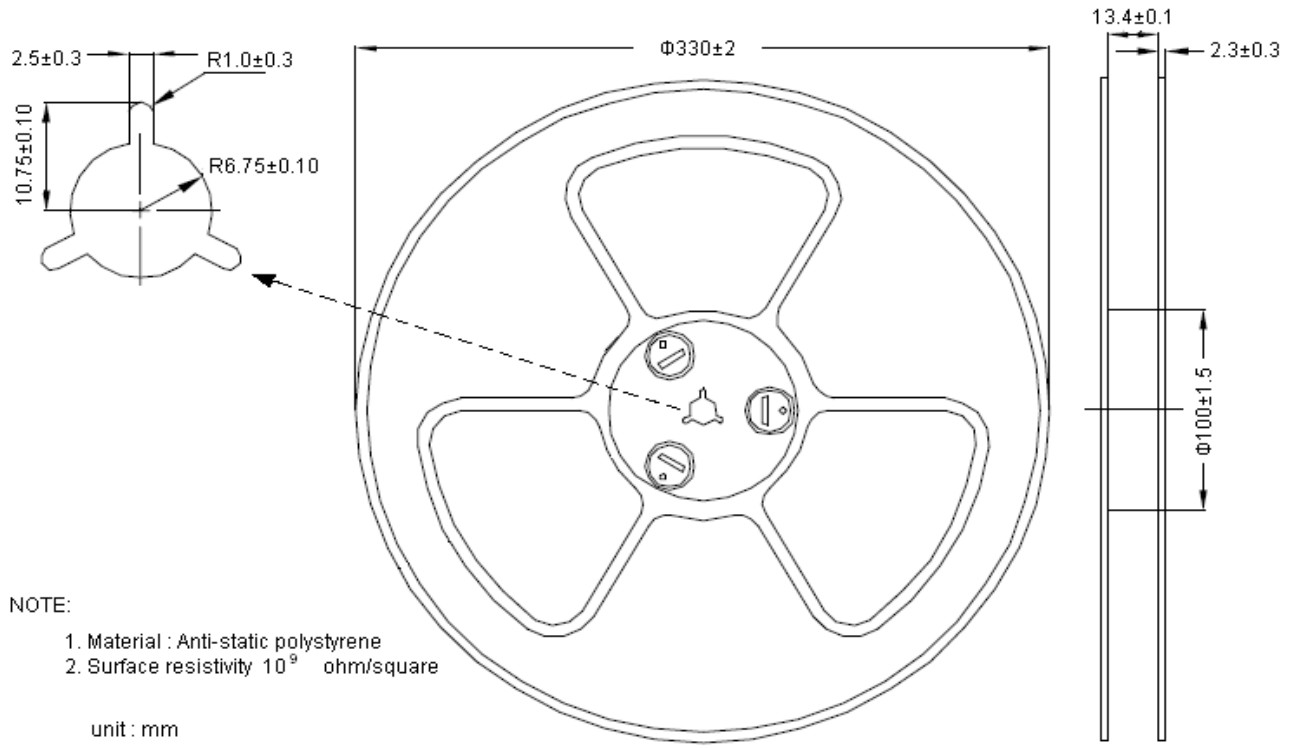
Transient Thermal Response Curves



Recommended Soldering Footprint



Reel Dimension

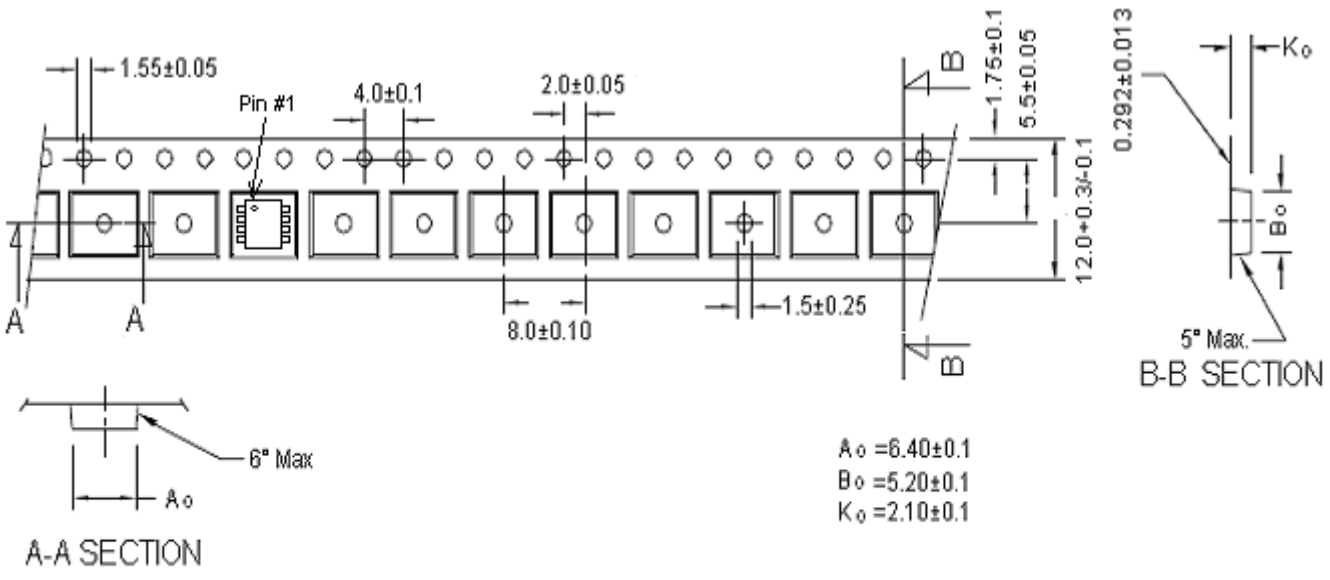


NOTE:

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:

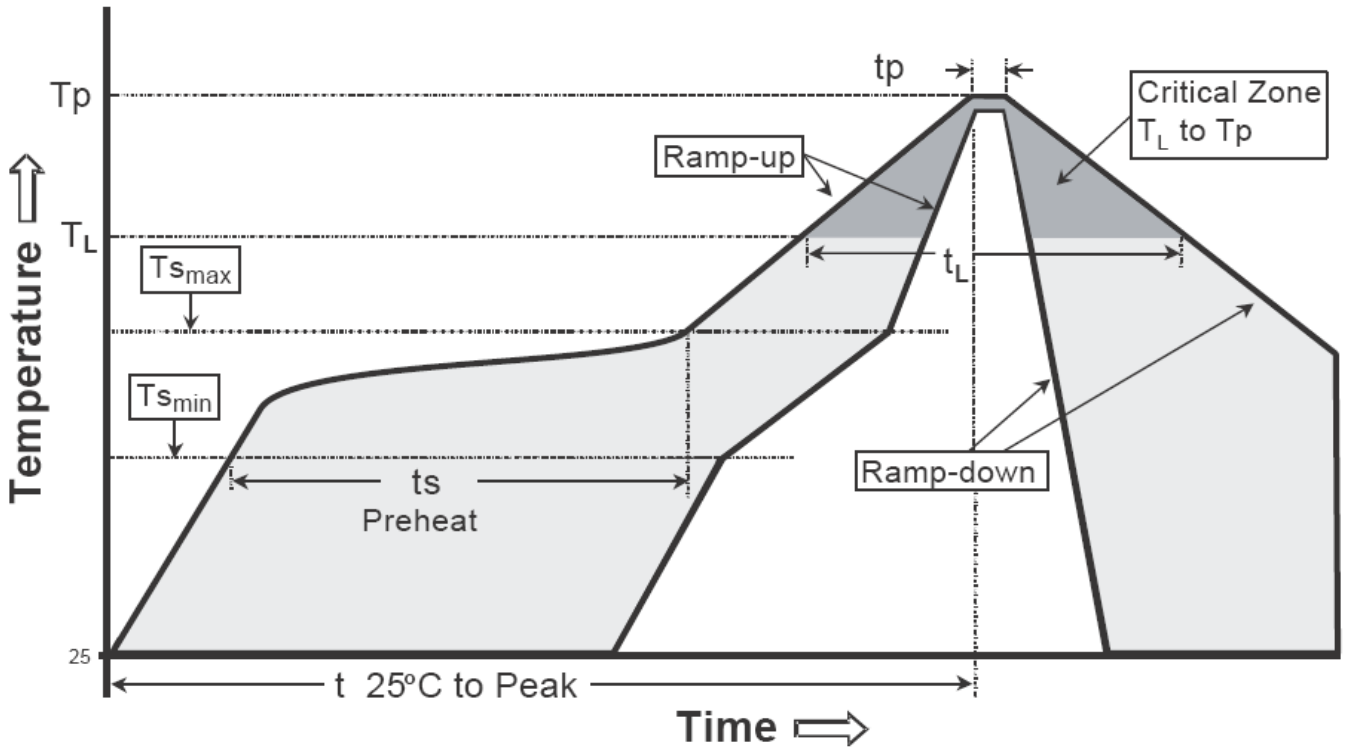
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material: conductive black polystyrene
4. Ao & Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6.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

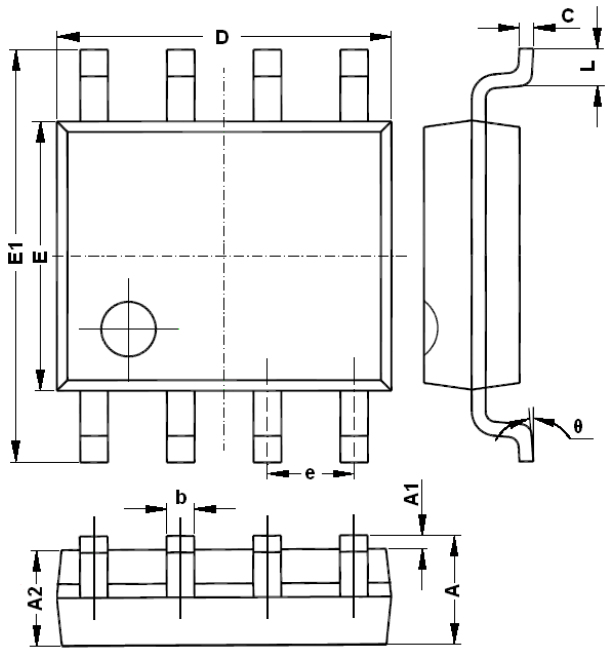
Recommended temperature profile for IR reflow



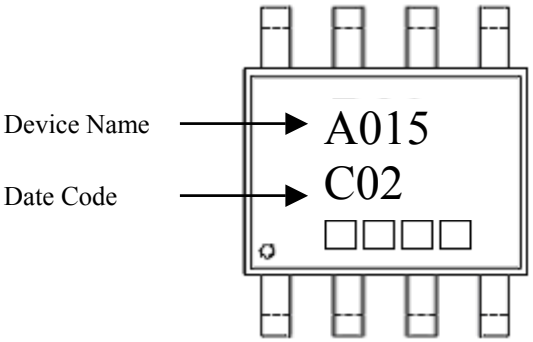
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time($t_{s\ min}$ to $t_{s\ max}$)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature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



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 : prodcution serial number, 01~99

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.