N- AND P-Channel Logic Level Enhancement Mode MOSFET

	N-CH	P-CH
BV_{DSS}	30V	-30V
I_D	7A	-6A
$R_{DSON(MAX.)}$	25mΩ	55mΩ

Description

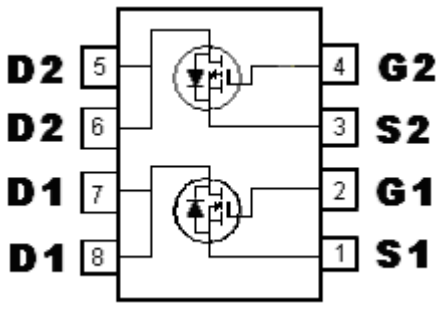
The MTC8958Q8 consists of a N-channel and a P-channel enhancement-mode MOSFET in a single SOP-8 package, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.
The SOP-8 package is universally preferred for all commercial-industrial surface mount applications.

Features

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

Equivalent Circuit

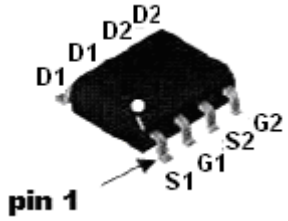
MTC8958Q8



G：Gate S：Source D：Drain

Outline

SOP-8



Ordering Information

Device	Package	Shipping
MTC8958Q8-0-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 (Tc=25°C, unless otherwise noted)

Parameter		Symbol	Limits		Unit
			N-channel	P-channel	
Drain-Source Breakdown Voltage		BV_{DSS}	30	-30	V
Gate-Source Voltage		V_{GS}	±20	±20	V
Continuous Drain Current (Note 2)	T_A=25 °C, V_{GS}=10V (-10V)	I_D	7	-6	A
	T_A=70 °C, V_{GS}=10V (-10V)		5.6	-4.8	A
Pulsed Drain Current (Note 1)		I_{DM}	20	-20	A
Power Dissipation for Dual Operation		P_D	2		W
Power Dissipation for Single Operation			1.6 (Note 2)		W
			0.9 (Note 3)		W
Operating Junction and Storage Temperature Range		Tj; Tstg	-55~+150		°C

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{th,j-c}$	40	°C/W
Thermal Resistance, Junction-to-ambient, max	$R_{th,j-a}$	78 (Note 2)	°C/W
		135 (Note 3)	°C/W

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.

N-Channel Electrical Characteristics (Tc=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	1.6	2.5	V	V_{DS}=V_{GS}, I_D=250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	1	μA	V_{DS}=30V, V_{GS}=0V
	-	-	10	μA	V_{DS}=24V, V_{GS}=0V, Tj=70°C
*$R_{DS(ON)}$	-	18	25	mΩ	V_{GS}=10V, I_D=7A
	-	26	35	mΩ	V_{GS}=4.5V, I_D=5A
*G_{FS}	-	7	-	S	V_{DS}=10V, I_D=7A
Dynamic					
Ciss	-	800	-	pF	V_{DS}=20V, V_{GS}=0V, f=1MHz
Coss	-	70	-	pF	
Crss	-	71	-	pF	
*$t_{d(ON)}$	-	6	-	ns	V_{DS}=15V, I_D=1A, V_{GS}=10V, R_G=6Ω
*t_r	-	10	-	ns	
*$t_{d(OFF)}$	-	24	-	ns	
*t_f	-	5	-	ns	
*Qg	-	8.6	-	nC	V_{DS}=15V, I_D=7A, V_{GS}=10V
*Qgs	-	2.8	-	nC	
*Qgd	-	2	-	nC	

Body Diode					
*V_{SD}	-	0.75	1.2	V	V_{GS}=0V, I_S=1A
*trr	-	29	-	ns	I_S=5A, V_{GS}=0V, dI/dt=100A/μs
*Qrr	-	10	-	nC	

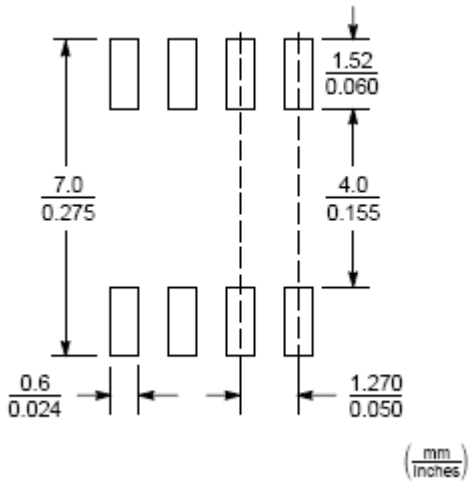
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	-30	-	-	V	V_{GS}=0, I_D=-250μA
$V_{GS(th)}$	-1.0	-1.4	-2.5		V_{DS}=V_{GS}, I_D=-250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	-1	μA	V_{DS}=-30V, V_{GS}=0V
	-	-	-10		V_{DS}=-24V, V_{GS}=0V, Tj=70°C
*$R_{DS(ON)}$	-	41	55	mΩ	V_{GS}=-10V, I_D=-6A
	-	60	75		V_{GS}=-4.5V, I_D=-4.2A
*G_{FS}	-	4	-	S	V_{DS}=-10V, I_D=-5.3A
Dynamic					
Ciss	-	838	-	pF	V_{DS}=-20V, V_{GS}=0V, f=1MHz
Coss	-	64	-		
Crss	-	65	-		
*$td_{(ON)}$	-	8	-	ns	V_{DS}=-15V, I_D=-1A, V_{GS}=-10V, R_G=6Ω
*tr	-	12	-		
*$td_{(OFF)}$	-	30	-		
*tf	-	23	-		
*Qg	-	12	-	nC	V_{DS}=-15V, I_D=-6A, V_{GS}=-10V
*Qgs	-	3.5	-		
*Qgd	-	3.3	-		
Body Diode					
*V_{SD}	-	-0.8	-1.2	V	V_{GS}=0V, I_S=-1A
*trr	-	32	-	ns	I_S=-4.5A, V_{GS}=0V, dI/dt=100A/μs
*Qrr	-	13.5	-	nC	

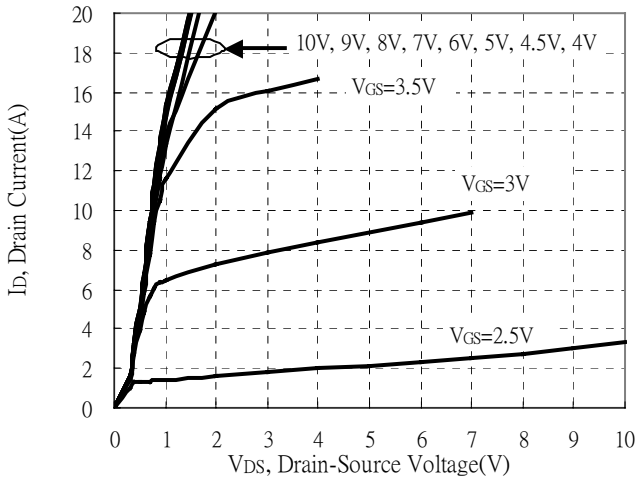
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

Recommended Soldering Footprint

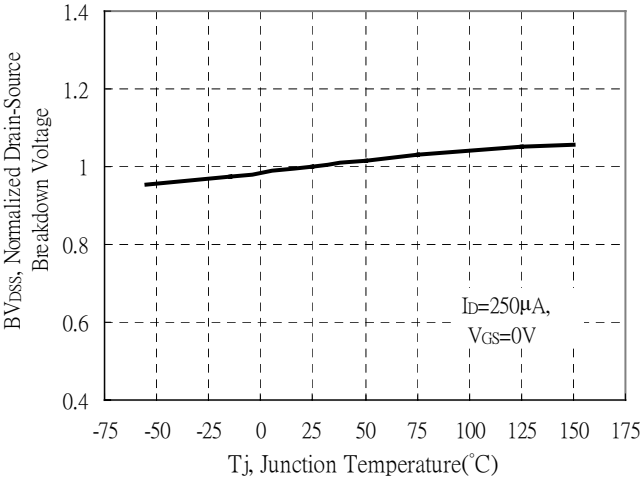


Typical Characteristics : Q1(N-channel)

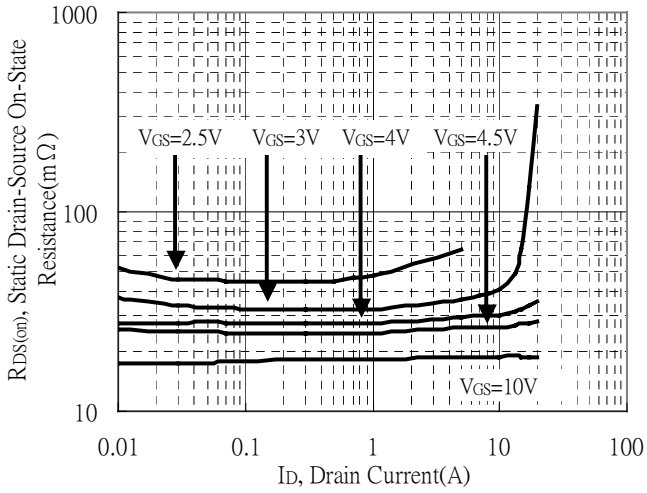
Typical Output Characteristics



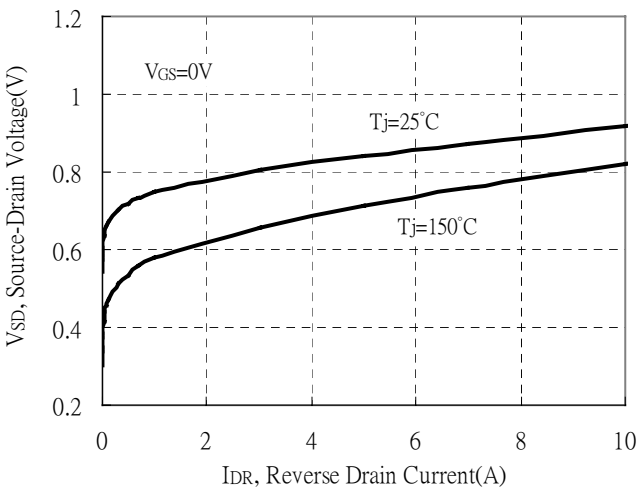
Brekdown Voltage vs Ambient Temperature



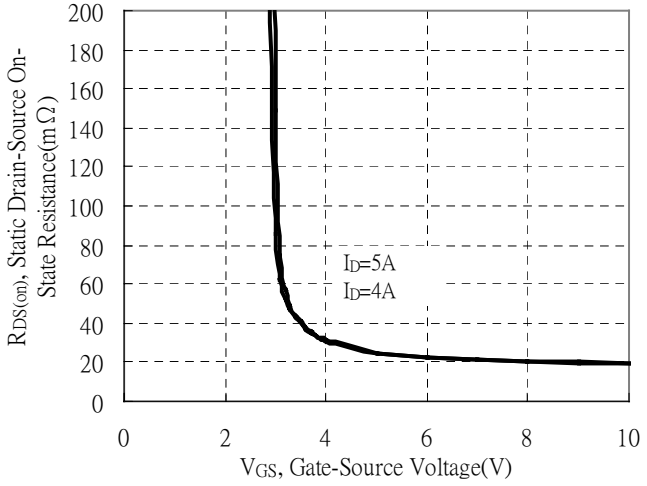
Static Drain-Source On-State resistance vs Drain Current



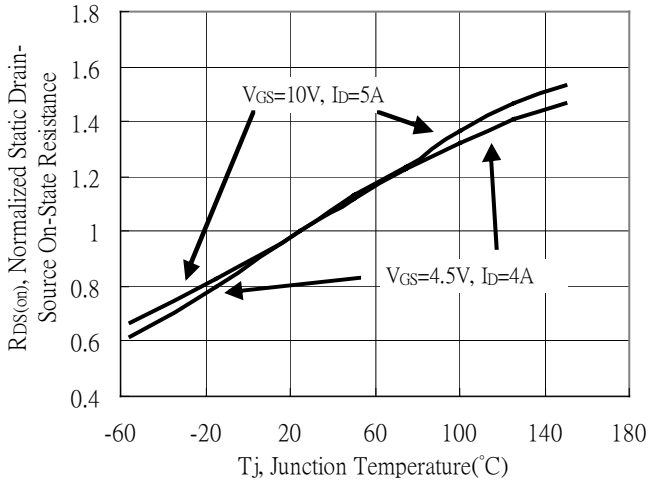
Reverse Drain Current vs Source-Drain Voltage



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

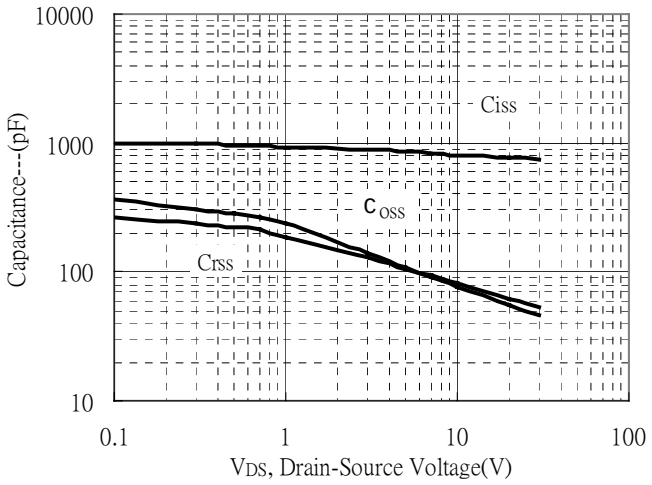


Drain-Source On-State Resistance vs Junction Tempearture

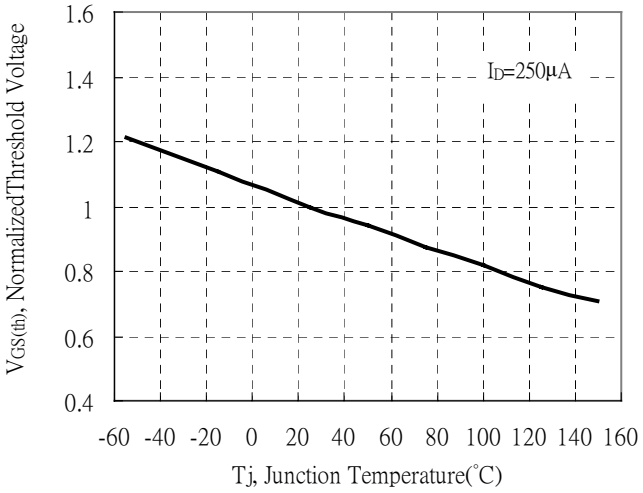


Typical Characteristics(Cont.) : Q1(N-channel)

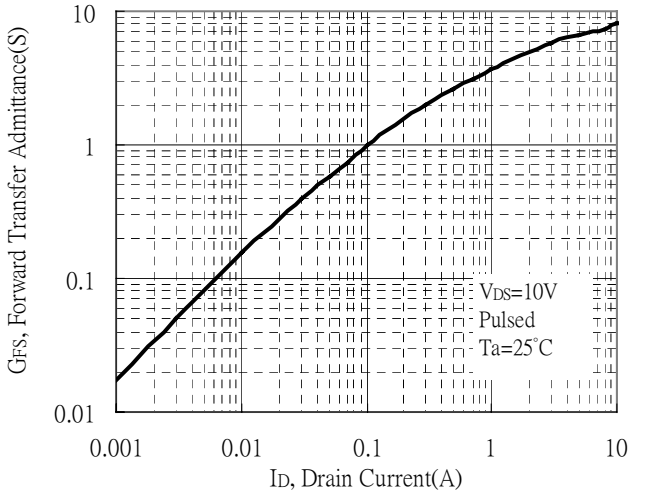
Capacitance vs Drain-to-Source Voltage



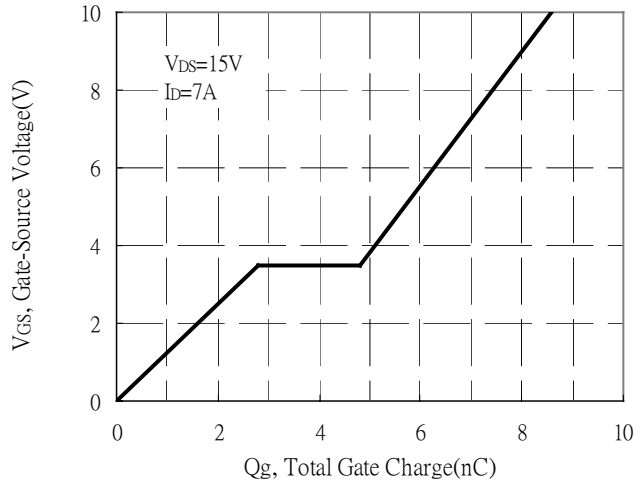
Threshold Voltage vs Junction Tempearture



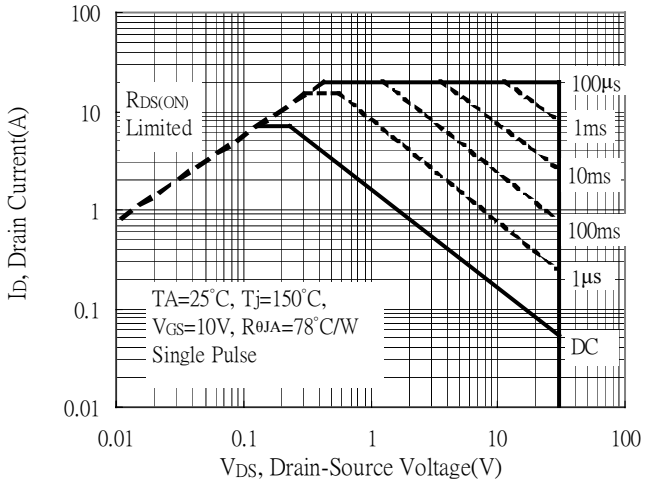
Forward Transfer Admittance vs Drain Current



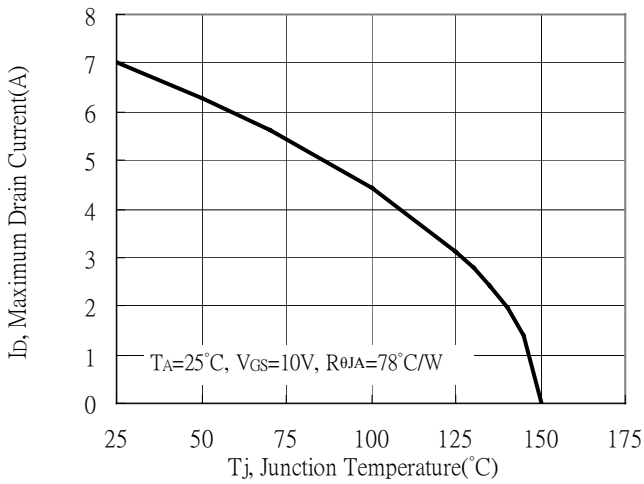
Gate Charge Characteristics



Maximum Safe Operating Area

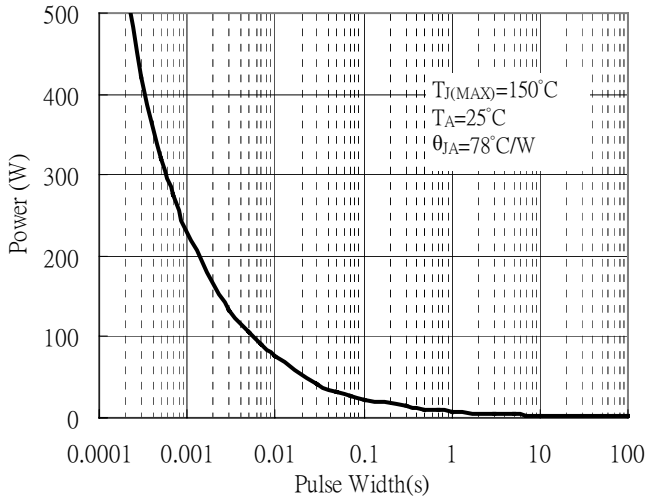


Maximum Drain Current vs JunctionTemperature

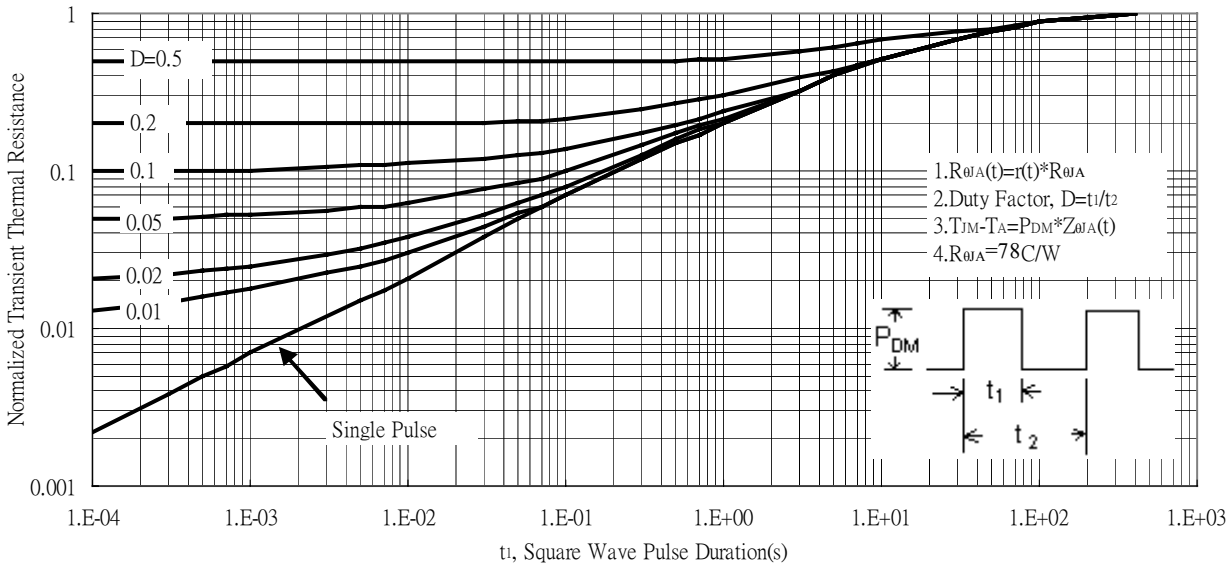


Typical Characteristics(Cont.) : Q1(N-channel)

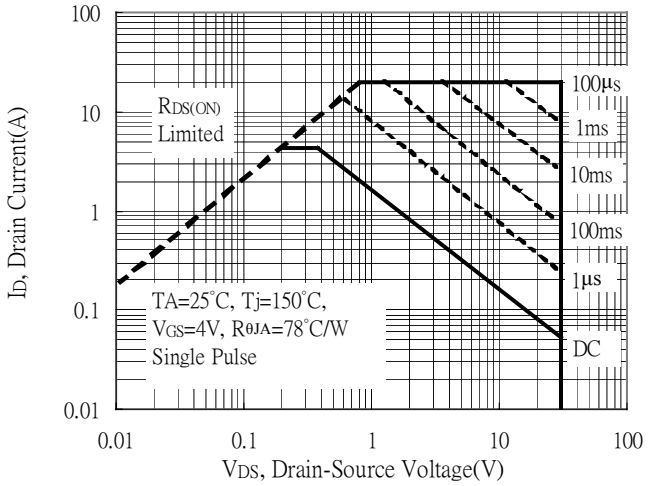
Single Pulse Maximum Power Dissipation



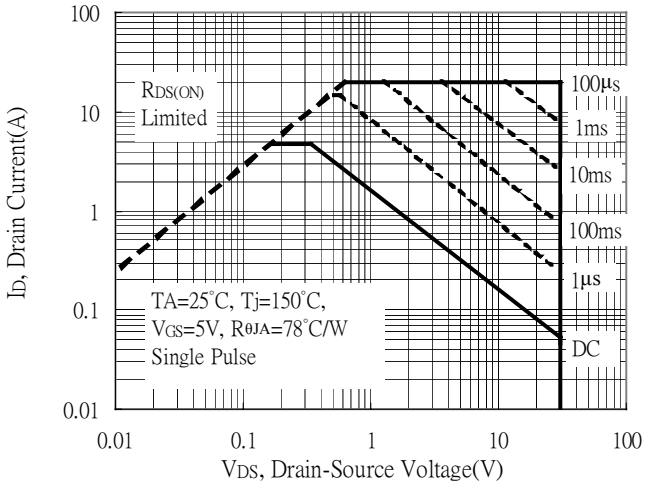
Transient Thermal Response Curves



Maximum Safe Operating Area

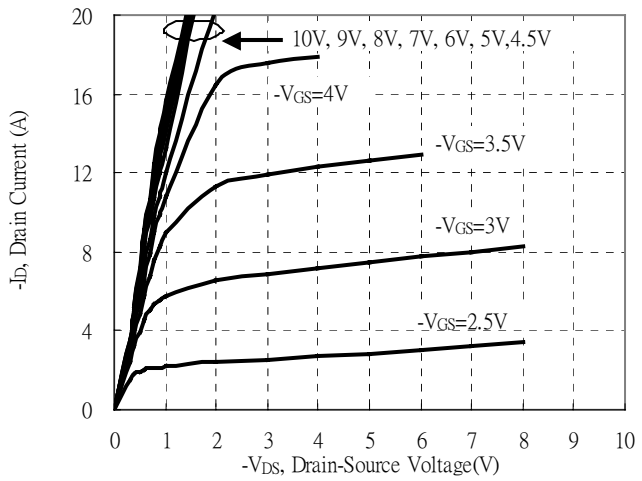


Maximum Safe Operating Area

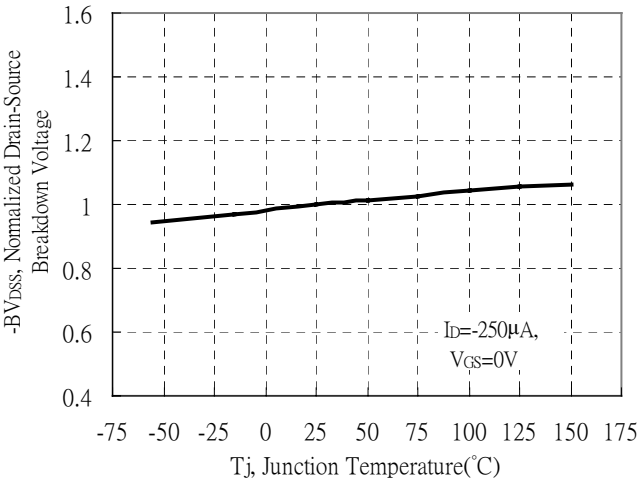


Typical Characteristics : Q2(P-channel)

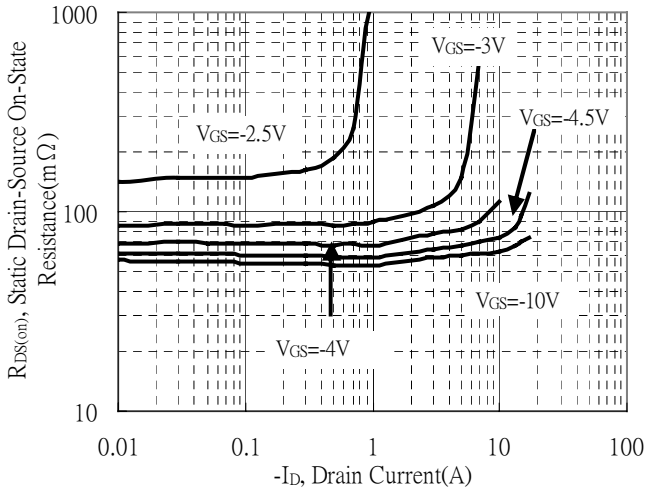
Typical Output Characteristics



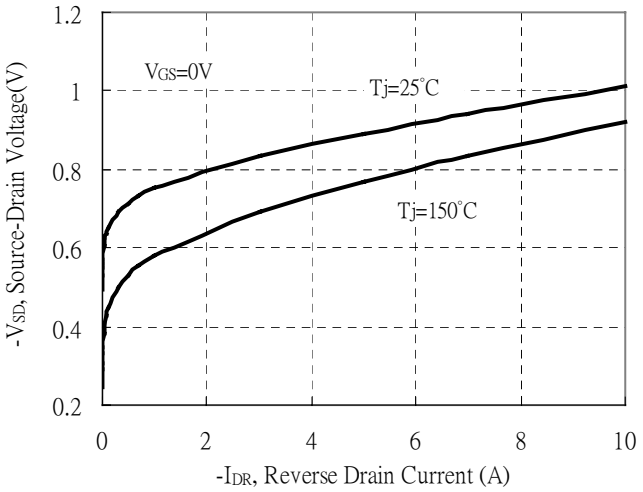
Brekdown Voltage vs Ambient Temperature



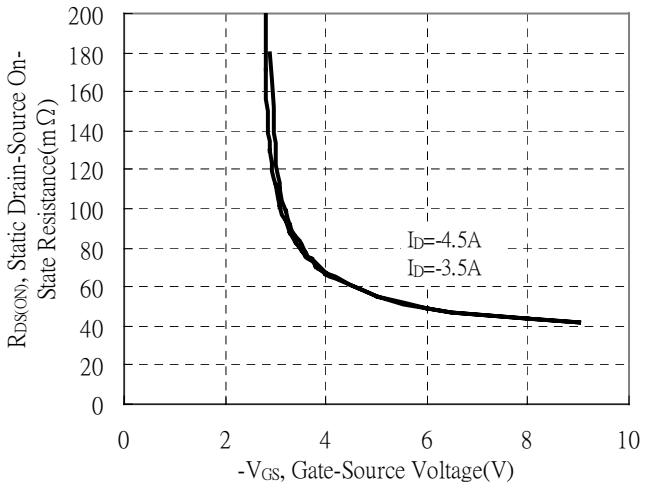
Static Drain-Source On-State resistance vs Drain Current



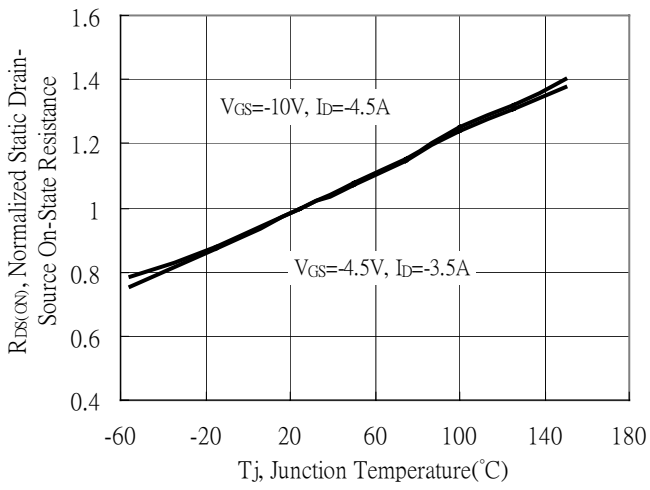
Reverse Drain Current vs Source-Drain Voltage



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

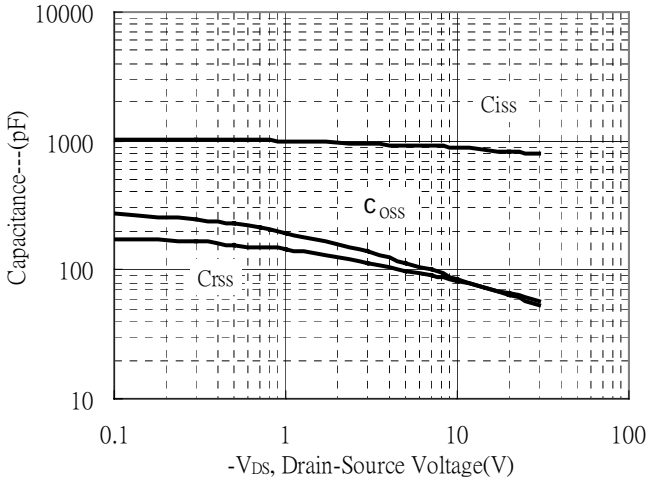


Drain-Source On-State Resistance vs Junction Tempearture

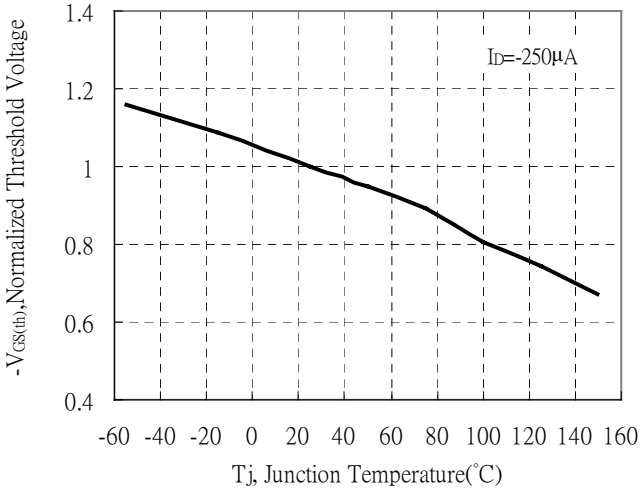


Typical Characteristics(Cont.) : Q2(P-channel)

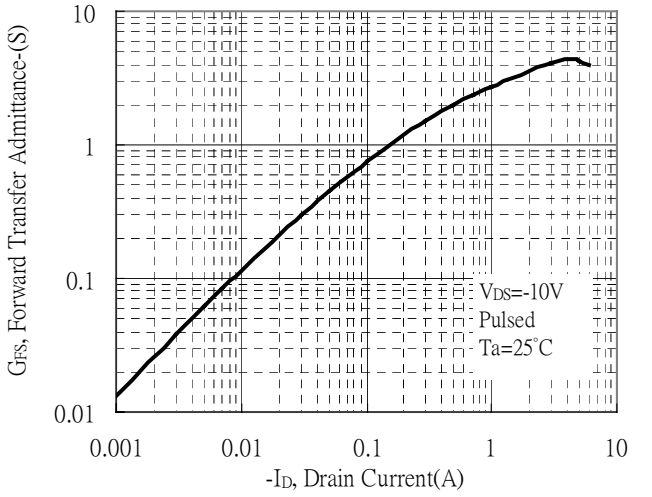
Capacitance vs Drain-to-Source Voltage



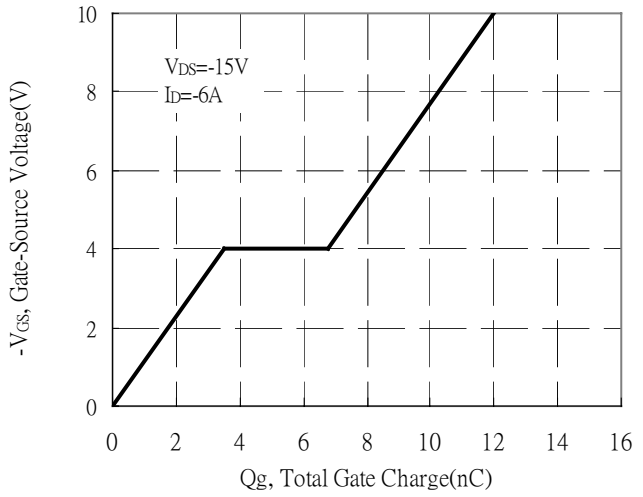
Threshold Voltage vs Junction Tempearture



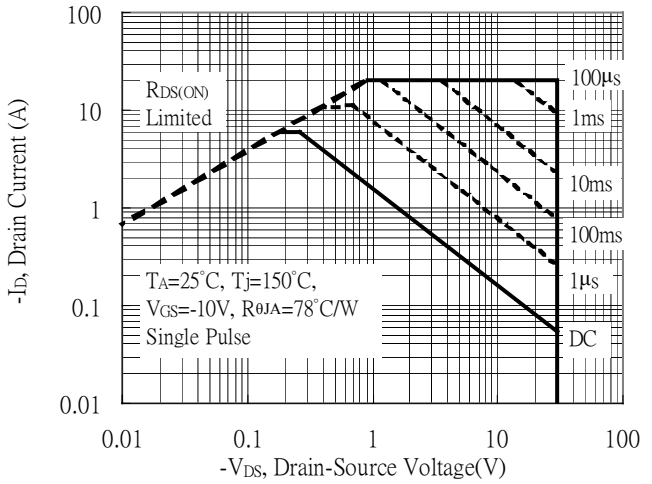
Forward Transfer Admittance vs Drain Current



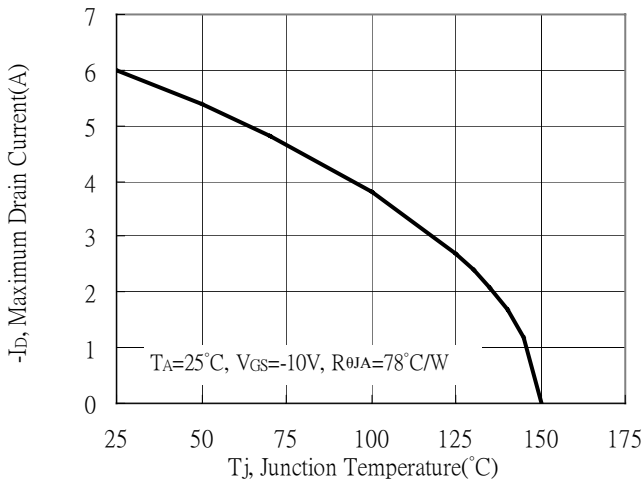
Gate Charge Characteristics



Maximum Safe Operating Area

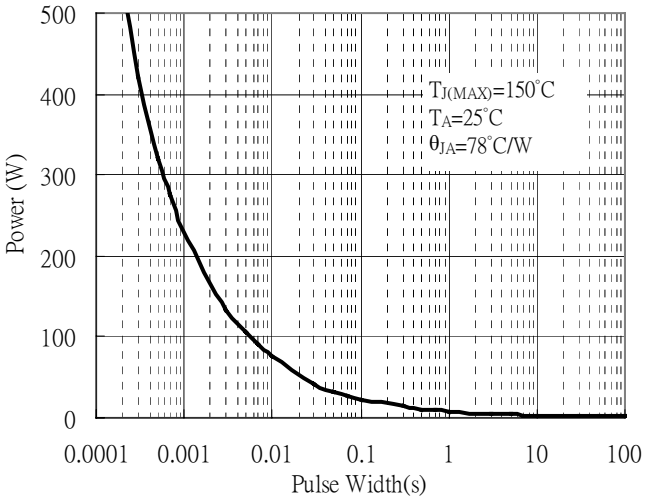


Maximum Drain Current vs JunctionTemperature

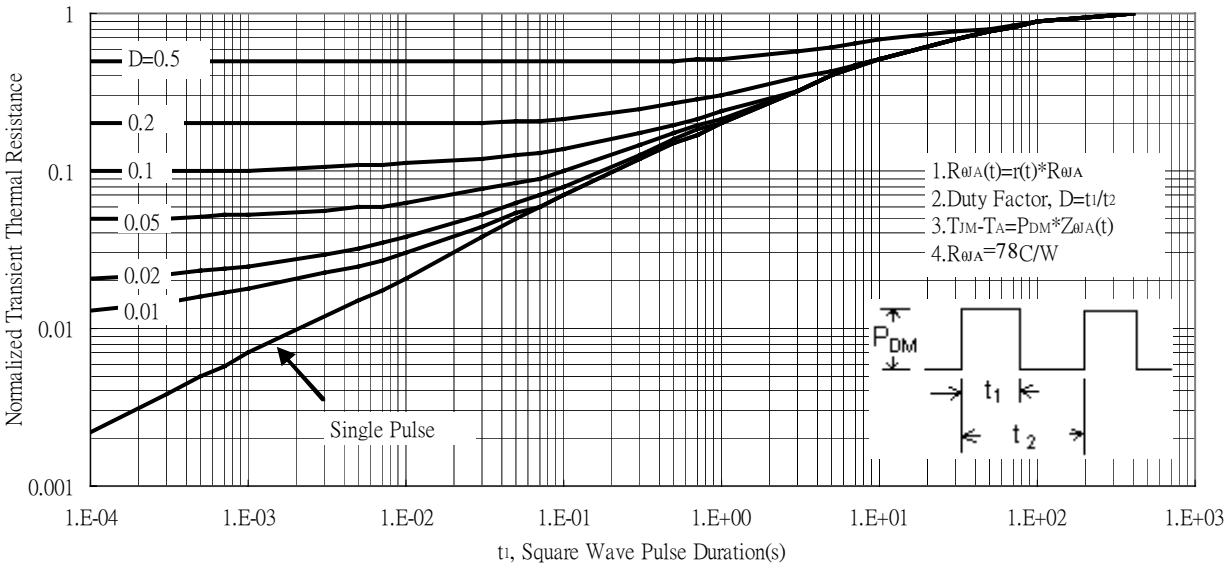


Typical Characteristics(Cont.) : Q2(P-channel)

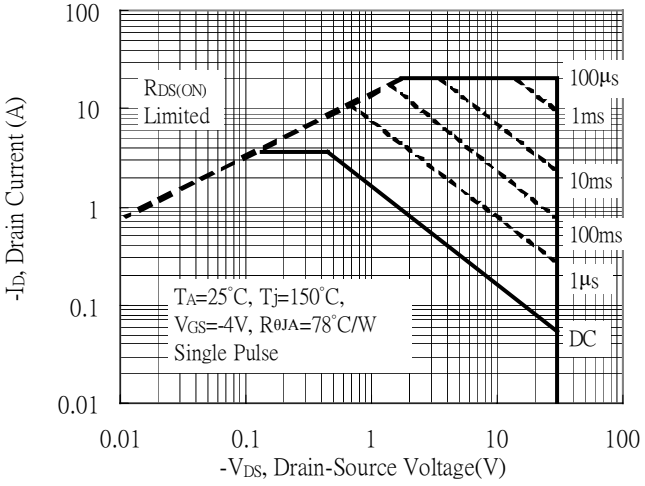
Single Pulse Maximum Power Dissipation



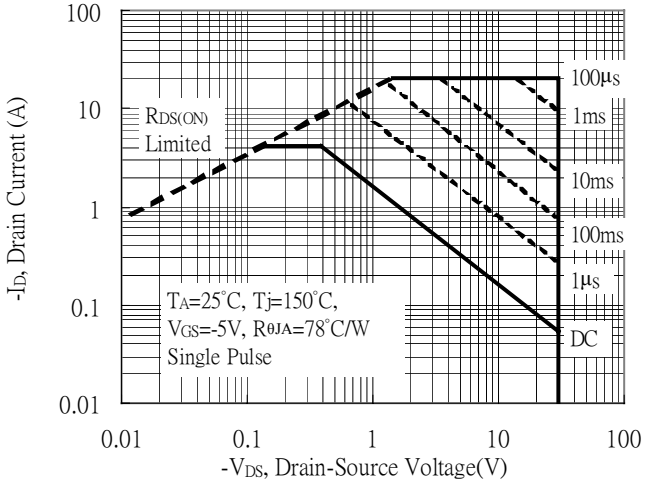
Transient Thermal Response Curves



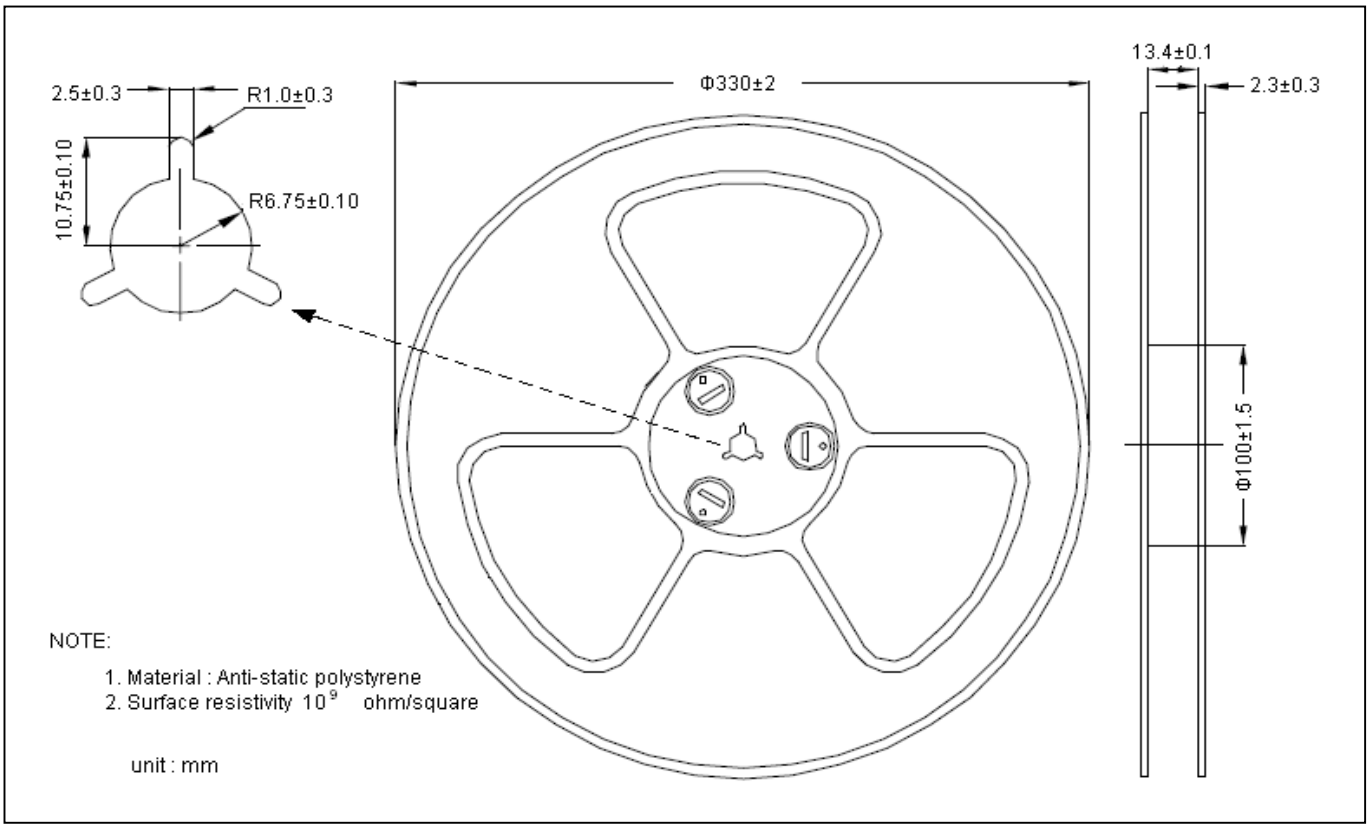
Maximum Safe Operating Area



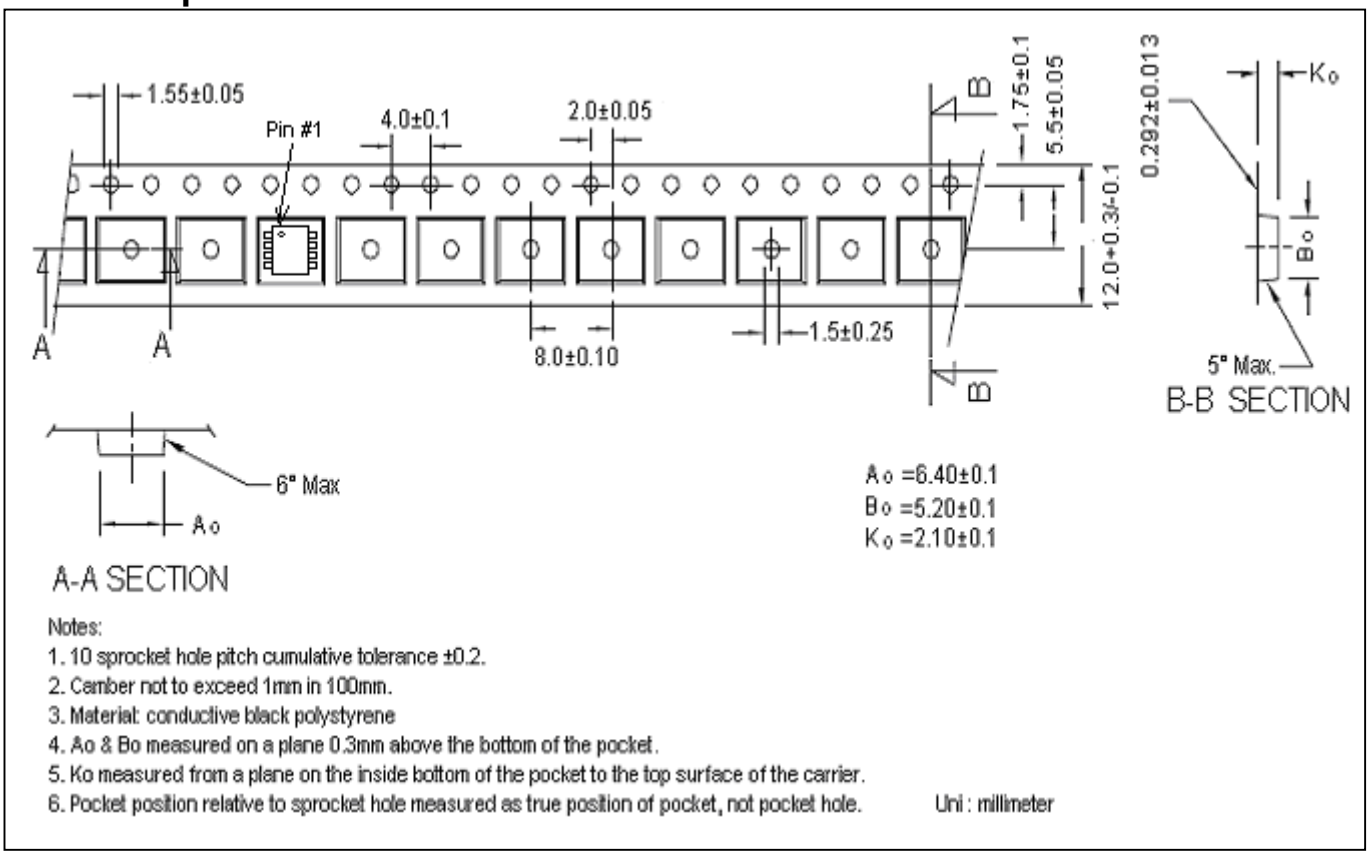
Maximum Safe Operating Area



Reel Dimension



Carrier Tape Dimension



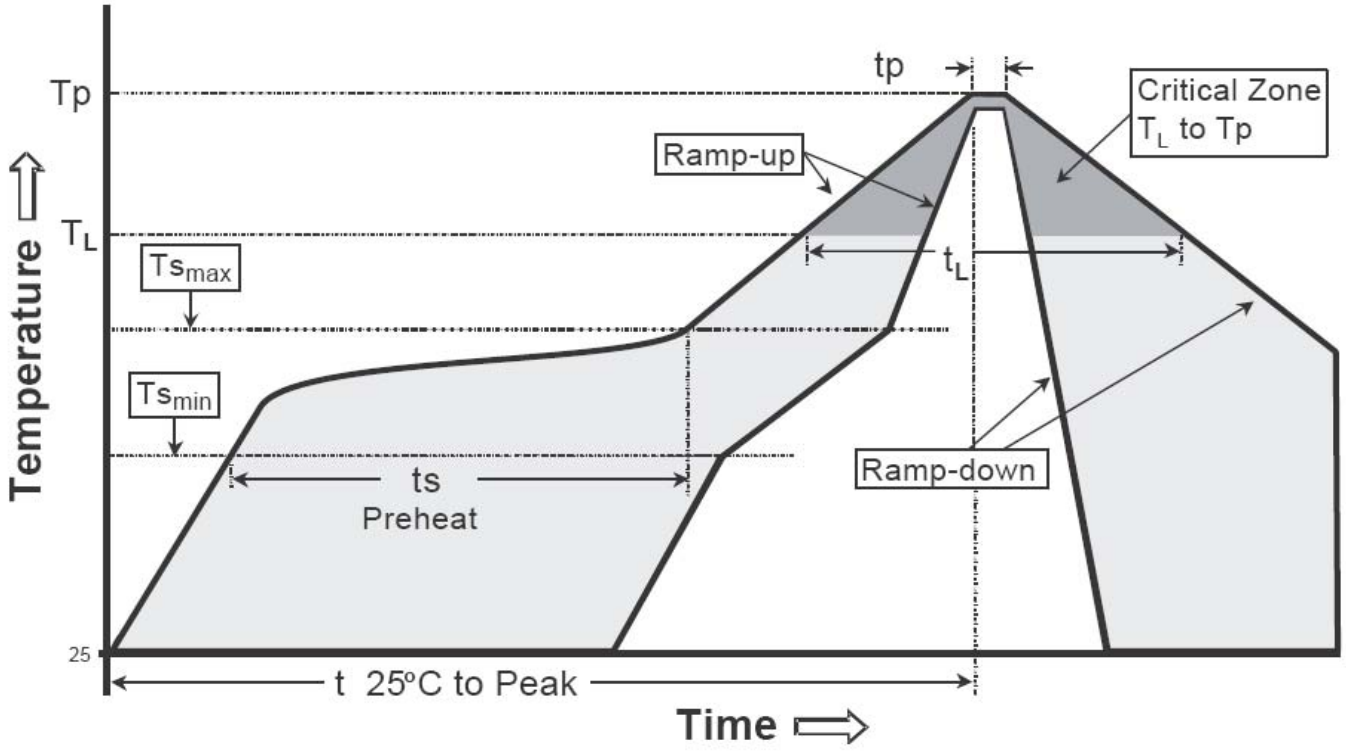
Notes:
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material: conductive black polystyrene
4. Ao & Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.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

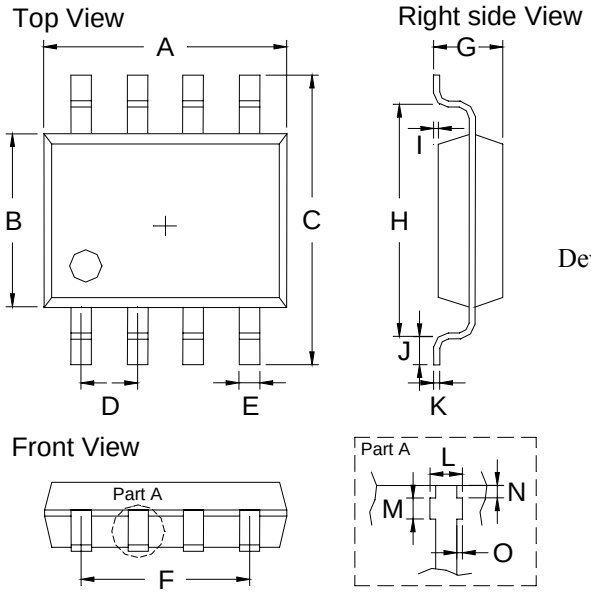
Recommended temperature profile for IR reflow

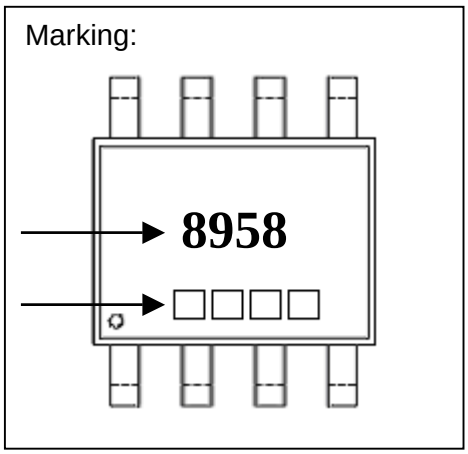


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(Ts min) −Temperature Max(Ts max) −Time(ts min to ts max)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (TL)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





8-Lead SOP-8 Plastic Package

*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1909	0.2007	4.85	5.10	I	0.0019	0.0078	0.05	0.20
B	0.1515	0.1555	3.85	3.95	J	0.0118	0.0275	0.30	0.70
C	0.2283	0.2441	5.80	6.20	K	0.0074	0.0098	0.19	0.25
D	0.0480	0.0519	1.22	1.32	L	0.0145	0.0204	0.37	0.52
E	0.0145	0.0185	0.37	0.47	M	0.0118	0.0197	0.30	0.50
F	0.1472	0.1527	3.74	3.88	N	0.0031	0.0051	0.08	0.13
G	0.0570	0.0649	1.45	1.65	O	0.0000	0.0059	0.00	0.15
H	0.1889	0.2007	4.80	5.10					

Notes: 1.Controlling dimension: millimeters.
2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.

Material:

- Lead: Pure tin plated.
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0.