

N- AND P-Channel Enhancement Mode Power MOSFET

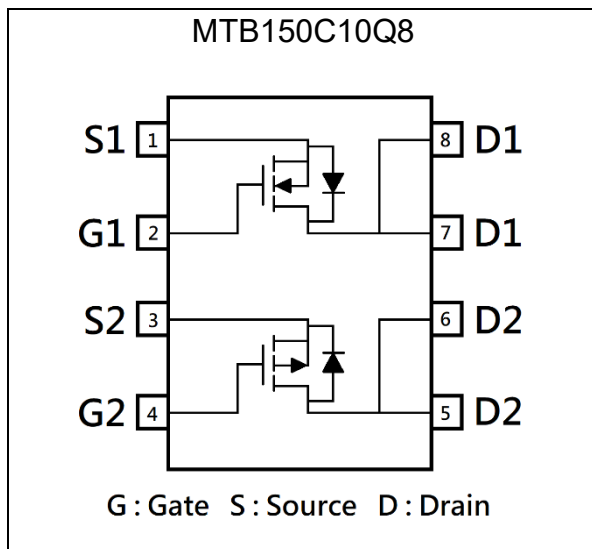
MTB150C10Q8

Features

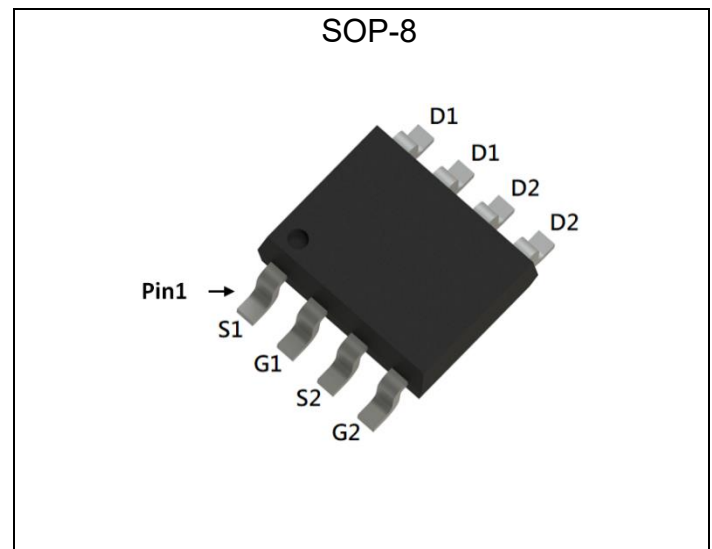
- Low On Resistance
- Low Gate Charge
- Fast Switching Characteristic
- Only for speed controlled fan

	N-CH	P-CH
BV_{DSS}	100V	-100V
$I_D@V_{GS}=(-)10V, T_C=25^{\circ}C$	5A	-4.1A
$I_D@V_{GS}=(-)10V, T_A=25^{\circ}C$	2.2A	-1.8A
$R_{DS(ON) typ. @V_{GS}=(-)10V}$	125mΩ	210mΩ
$R_{DS(ON) typ. @V_{GS}=(-)5V}$	130mΩ	220mΩ

Equivalent Circuit

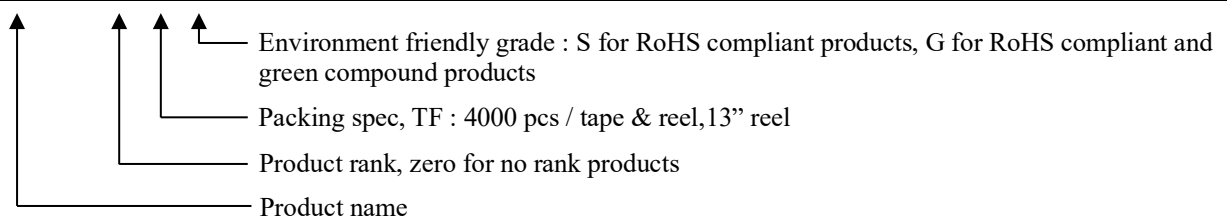


Outline



Ordering Information

Device	Package	Shipping
MTB150C10Q8-0-TF-G	SOP-8 (Pb-free lead plating and halogen-free package)	4000 pcs / Tape & Reel





Absolute Maximum Ratings (T_A=25°C)

Parameter	Symbol	Limits		Unit	
		N-CH	P-CH		
Drain-Source Voltage	V _{DS}	100	-100	V	
Gate-Source Voltage	V _{GS}	±20	±20		
Continuous Drain Current @ V _{GS} =(-)10V, T _C =25°C	*a	I _D	5	-4.1	A
Continuous Drain Current @ V _{GS} =(-)10V, T _C =100°C	*a		3.1	-2.6	
Continuous Drain Current @ V _{GS} =(-)10V, T _A =25°C	*b		2.2	-1.8	
Continuous Drain Current @ V _{GS} =(-)10V, T _A =70°C	*b		1.8	-1.5	
Pulsed Drain Current	*c	I _{DM}	15	-12	
Continuous Body Diode Forward Current @ T _C =25°C	*a	I _S	3.8	-3.2	
Total Power Dissipation	T _C =25°C	P _D	9	9.6	W
	T _C =100°C		3.6	3.8	
	T _A =25°C		1.8	1.8	
	T _A =70°C		1.1	1.1	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-55~+150		°C	

Thermal Data

Parameter	Symbol	Steady State		Unit
Thermal Resistance, Junction-to-case	R _{θJC}	14	13	°C/W
Thermal Resistance, Junction-to-ambient	*b R _{θJA}	70	70	

Note:

- *a. The power dissipation P_D is based on T_{J(MAX)}=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
- *b. The value of R_{θJA} is measured with the device mounted on 1 in² FR-4 board with 2 oz. copper, in a still air environment with T_A=25°C. The power dissipation P_D is based on R_{θJA} and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.
- *c. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150°C. Ratings are based on low frequency and low duty cycles to keep initial T_J=25°C.



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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	100	-	-	V	V _{GS} =0V, I _D =250μA
V _{GS(th)}	1	-	2.5		V _{DS} =V _{GS} , I _D =250μA
G _{FS}	-	6	-	S	V _{DS} =5V, I _D =2A
I _{GSS}	-	-	±100	nA	V _{GS} =±20V, V _{DS} =0V
I _{DSS}	-	-	1	μA	V _{DS} =80V, V _{GS} =0V
R _{DS(ON)}	-	125	165	mΩ	V _{GS} =10V, I _D =2A
	-	130	185		V _{GS} =5V, I _D =1.5A
Dynamic					
C _{iss}	-	840	-	pF	V _{DS} =50V, V _{GS} =0V, f=1MHz
C _{oss}	-	26	-		
C _{rss}	-	26	-		
R _g	-	3.6	-	Ω	f=1MHz
Q _g *1, 2	-	21	-	nC	V _{DS} =50V, I _D =2A, V _{GS} =10V
Q _{gs} *1, 2	-	2.3	-		
Q _{gd} *1, 2	-	4	-		
t _{d(ON)} *1, 2	-	10	-	ns	V _{DS} =50V, I _D =2A, V _{GS} =10V, R _{GS} =1Ω
t _r *1, 2	-	16	-		
t _{d(OFF)} *1, 2	-	40	-		
t _f *1, 2	-	6.5	-		
Source-Drain Diode					
V _{SD} *1	-	0.8	1.2	V	I _S =2A, V _{GS} =0V
t _{rr}	-	20	-	ns	I _F =2A, dI _F /dt=100A/μs
Q _{rr}	-	18	-	nC	

Note:

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

*2. Independent of operating temperature



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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	-100	-	-	V	V _{GS} =0V, I _D =-250μA
V _{GS(th)}	-1	-	-2.5		V _{DS} =V _{GS} , I _D =-250μA
G _{FS}	-	7	-	S	V _{DS} =-5V, I _D =-1.5A
I _{GSS}	-	-	±100	nA	V _{GS} =±20V, V _{DS} =0V
I _{DSS}	-	-	-1	μA	V _{DS} =-80V, V _{GS} =0V
R _{DS(ON)}	-	210	275	mΩ	V _{GS} =-10V, I _D =-1.5A
	-	220	310		V _{GS} =-5V, I _D =-1A
Dynamic					
C _{iss}	-	1400	-	pF	V _{DS} =-50V, V _{GS} =0V, f=1MHz
C _{oss}	-	35	-		
C _{rss}	-	30	-		
R _g	-	22	-	Ω	f=1MHz
Q _g *1, 2	-	26	-	nC	V _{DS} =-50V, I _D =-1.5A, V _{GS} =-10V
Q _{gs} *1, 2	-	3.5	-		
Q _{gd} *1, 2	-	4	-		
t _{d(ON)} *1, 2	-	7.5	-	ns	V _{DS} =-50V, I _D =-1.5A, V _{GS} =-10V, R _{GS} =1Ω
t _r *1, 2	-	20	-		
t _{d(OFF)} *1, 2	-	120	-		
t _f *1, 2	-	32	-		
Source-Drain Diode					
V _{SD} *1	-	-0.8	-1.2	V	I _S =-1.5A, V _{GS} =0V
t _{rr}	-	19	-	ns	I _F =-1.5A, dI _F /dt=100A/μs
Q _{rr}	-	16	-	nC	

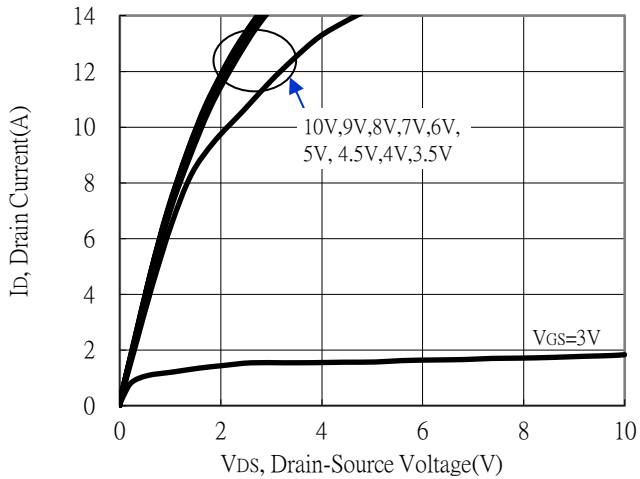
Note:

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

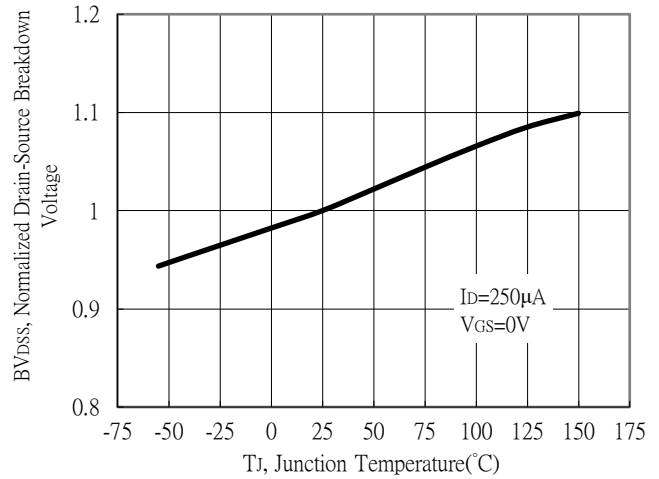
*2. Independent of operating temperature

Typical Characteristics : Q1(N-channel)

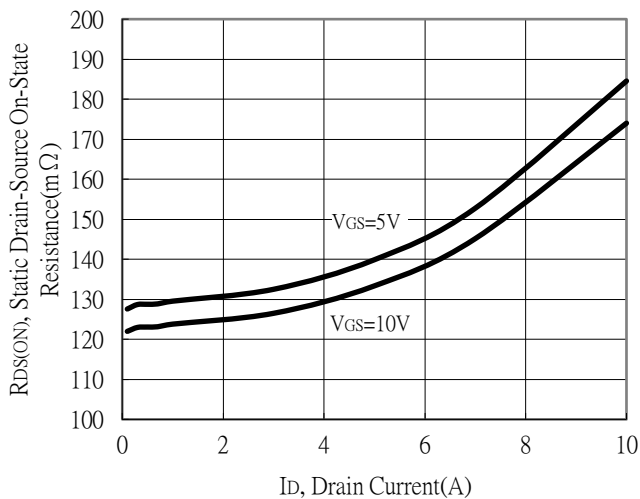
Typical Output Characteristics



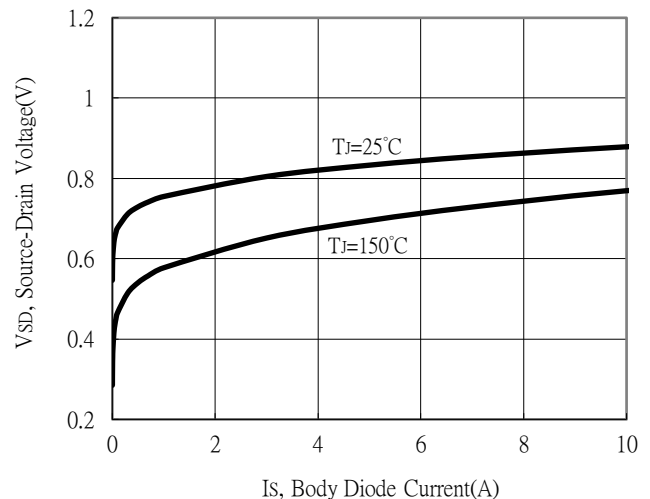
Breakdown Voltage vs Ambient Temperature



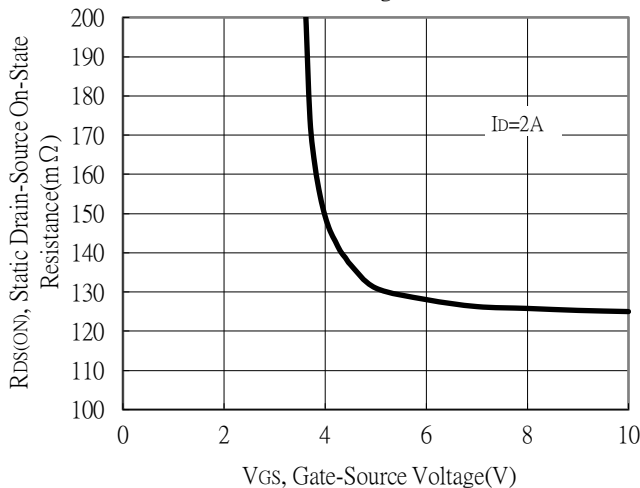
Static Drain-Source On-State resistance vs Drain Current



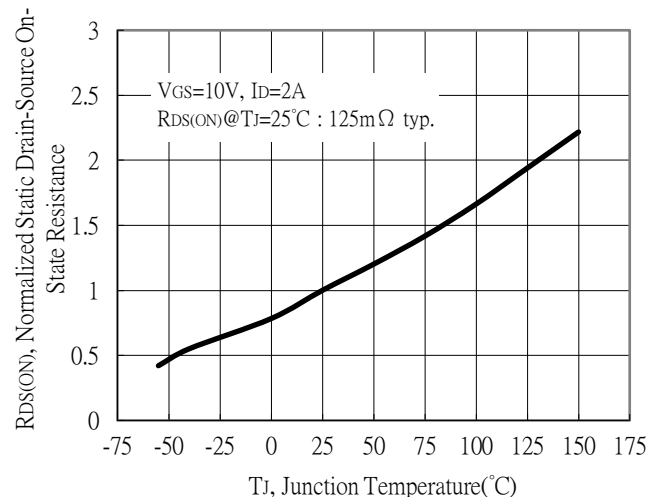
Body Diode Current vs Source-Drain Voltage



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

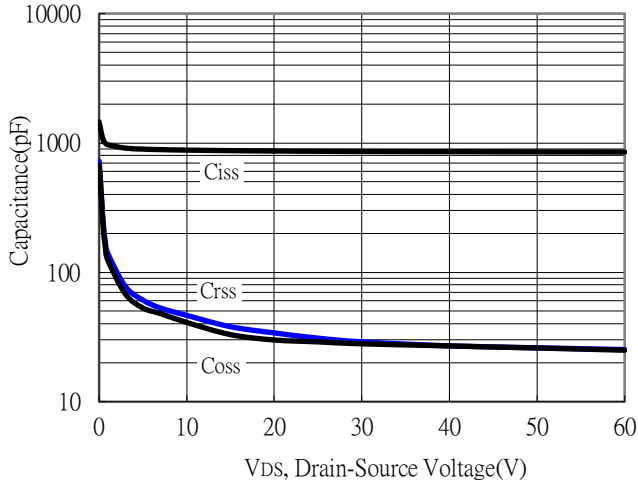


Drain-Source On-State Resistance vs Junction Temperature

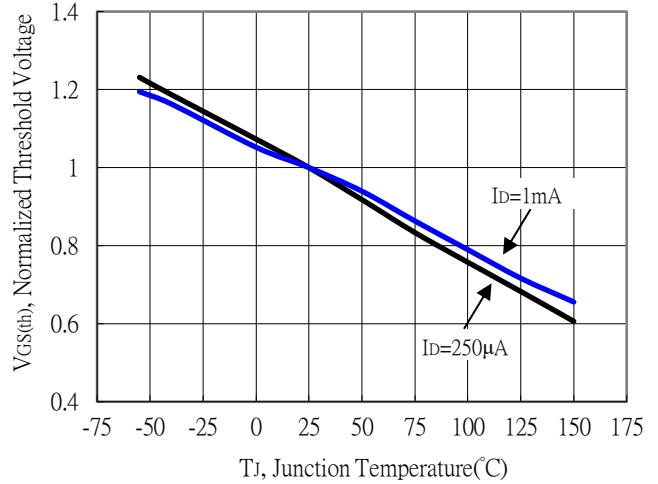


Typical Characteristics (Cont.) : Q1(N-channel)

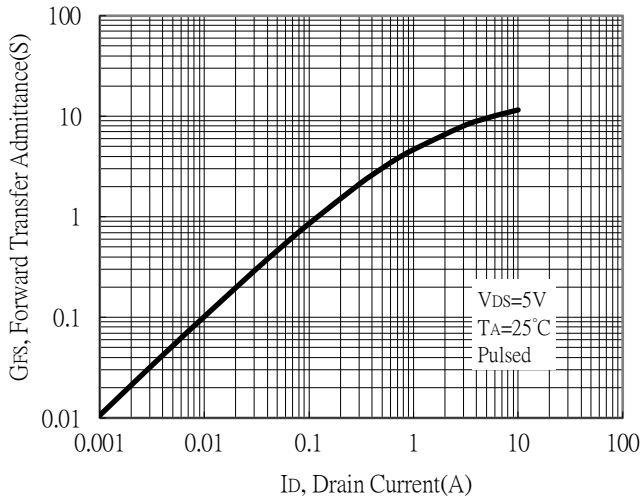
Capacitance vs Drain-to-Source Voltage



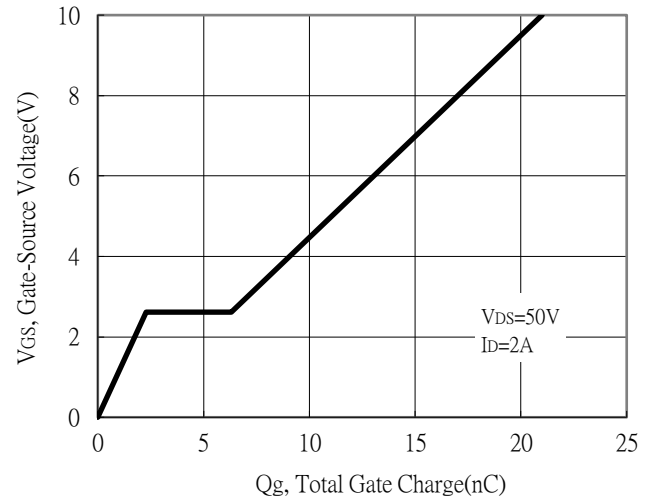
Threshold Voltage vs Junction Temperature



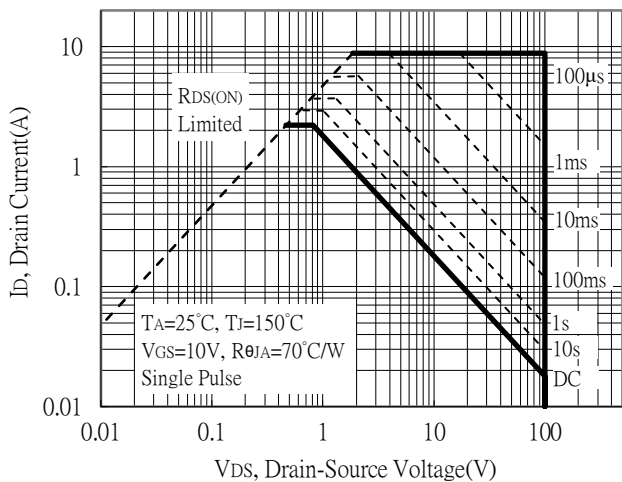
Forward Transfer Admittance vs Drain Current



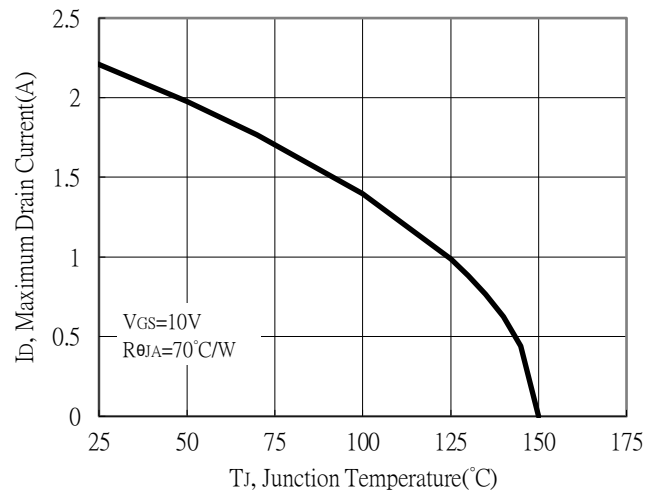
Gate Charge Characteristics



Maximum Safe Operating Area

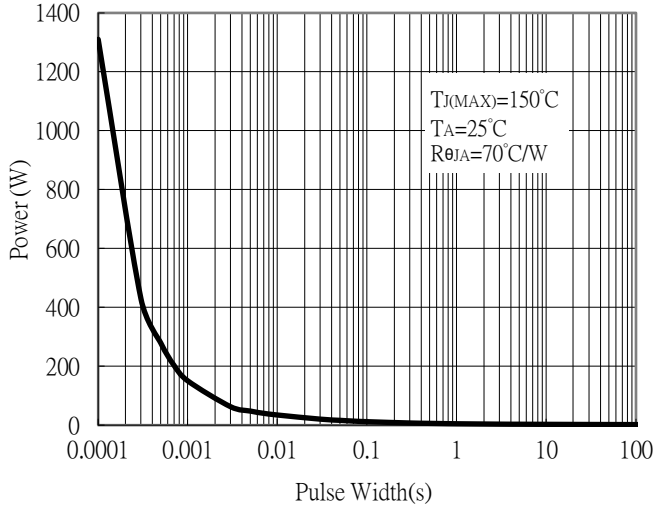


Maximum Drain Current vs Junction Temperature

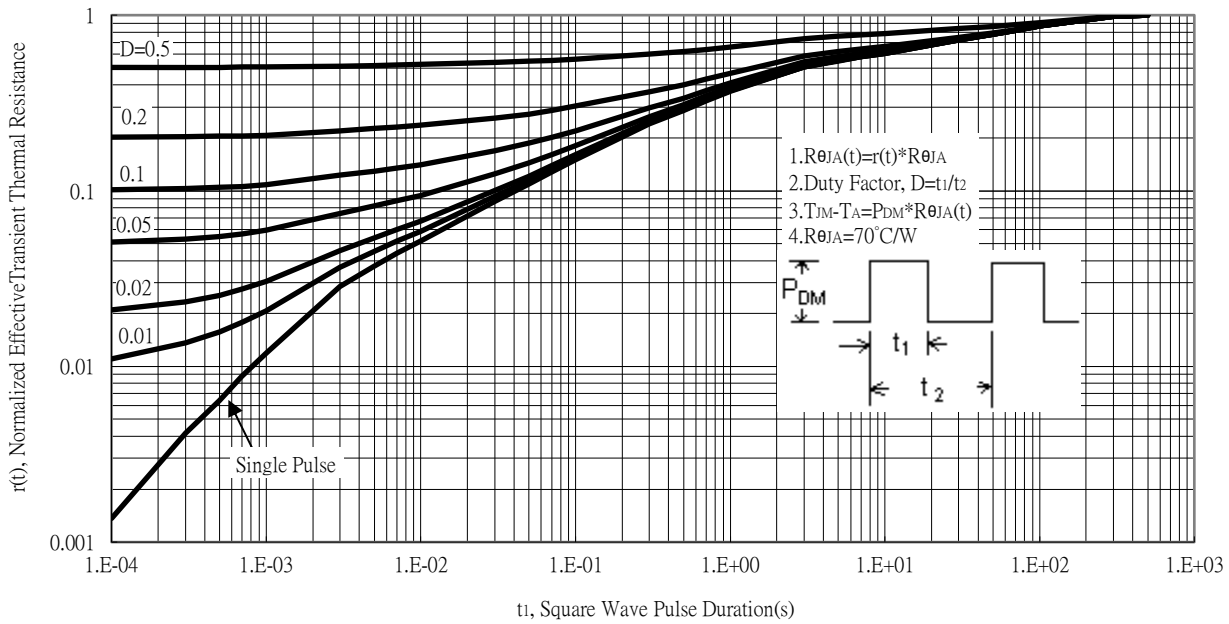


Typical Characteristics (Cont.) : Q1(N-channel)

Single Pulse Power Rating, Junction to Ambient

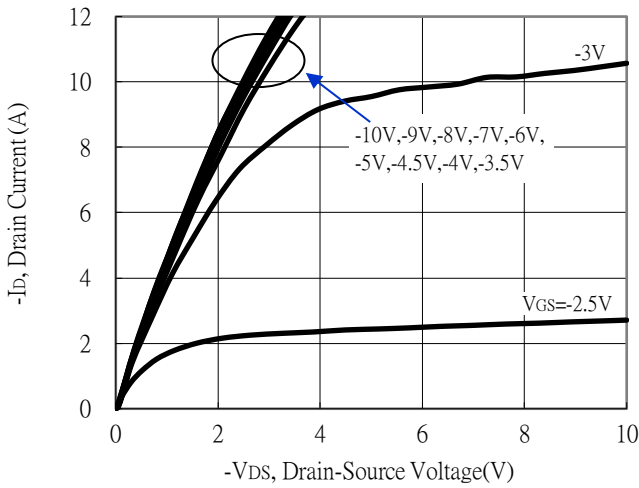


Transient Thermal Response Curves

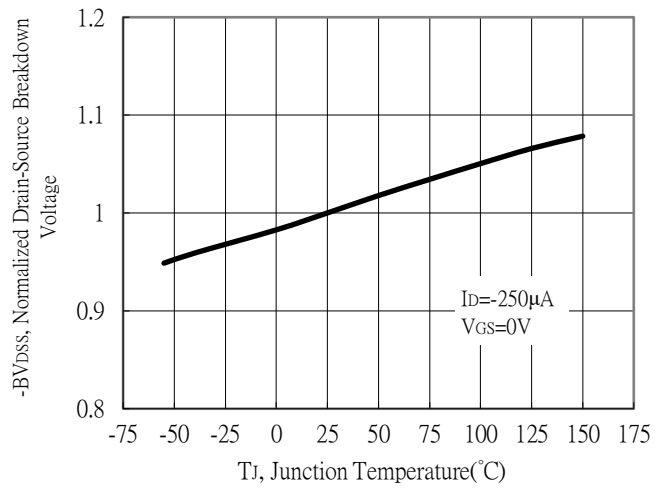


Typical Characteristics : Q2(P-channel)

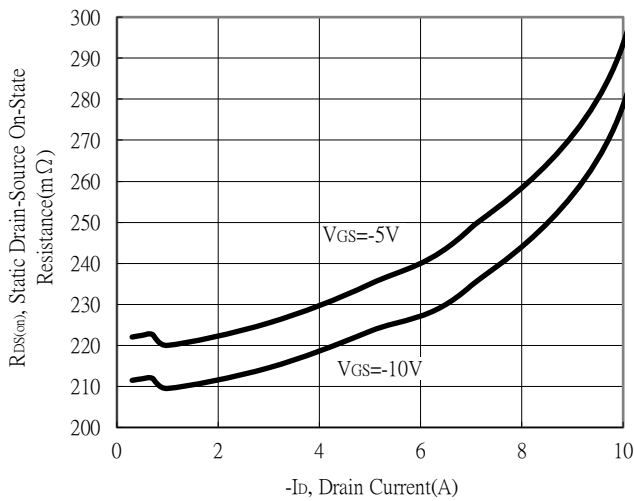
Typical Output Characteristics



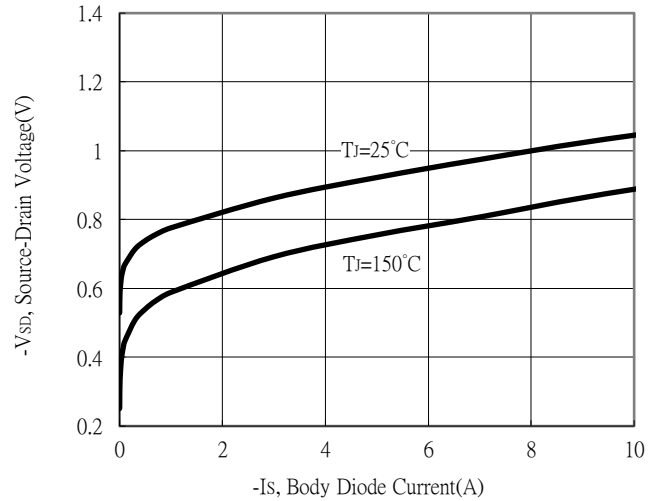
Brekdown Voltage vs Ambient Temperature



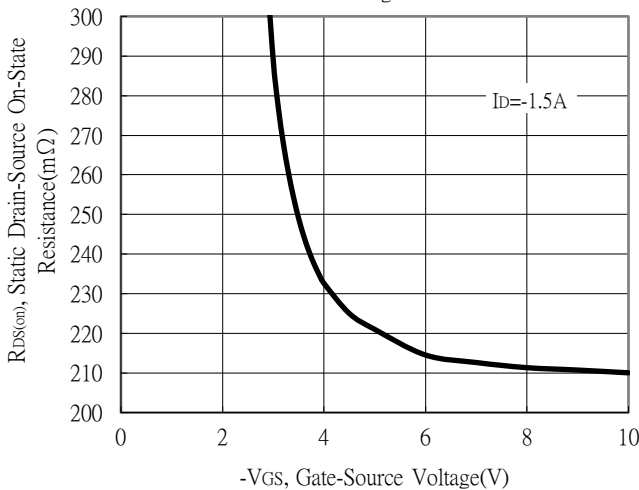
Static Drain-Source On-State resistance vs Drain Current



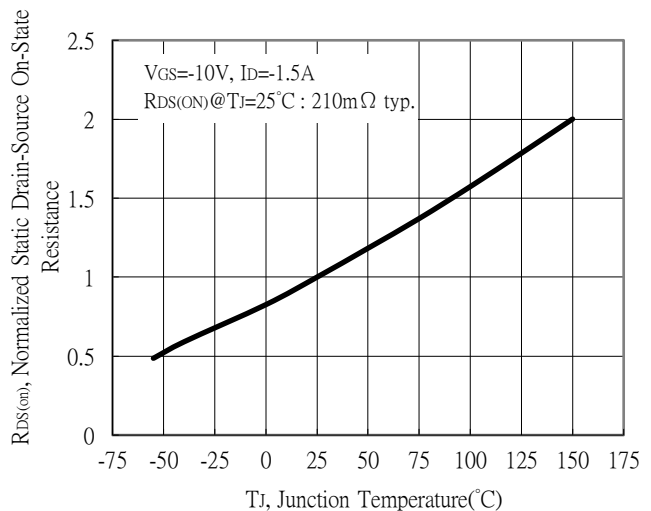
Body Diode Current vs Source-Drain Voltage



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

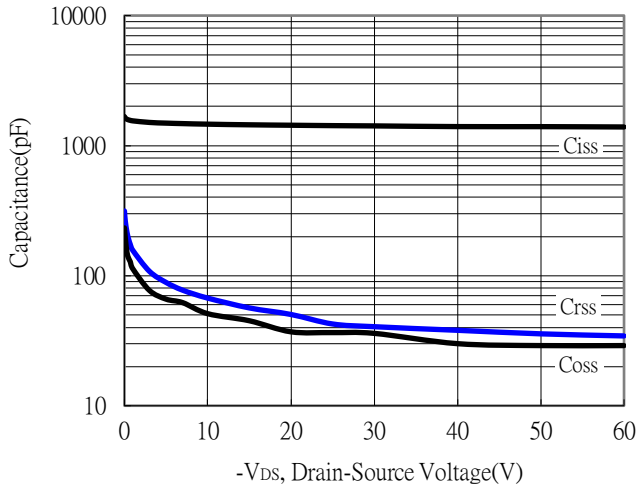


Drain-Source On-State Resistance vs Junction Temperature

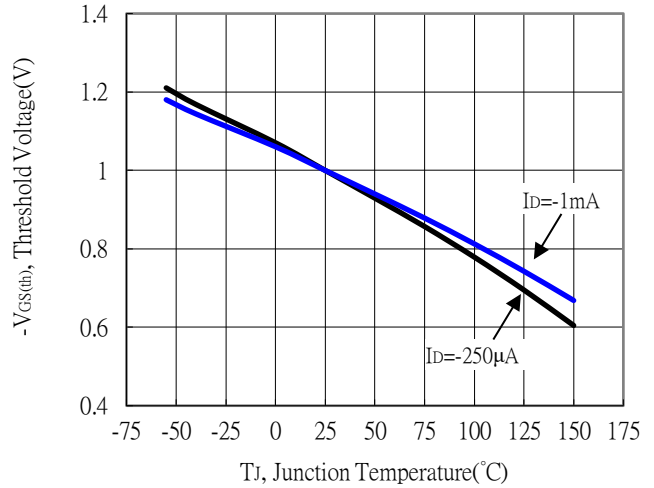


Typical Characteristics (Cont.) : Q2(P-channel)

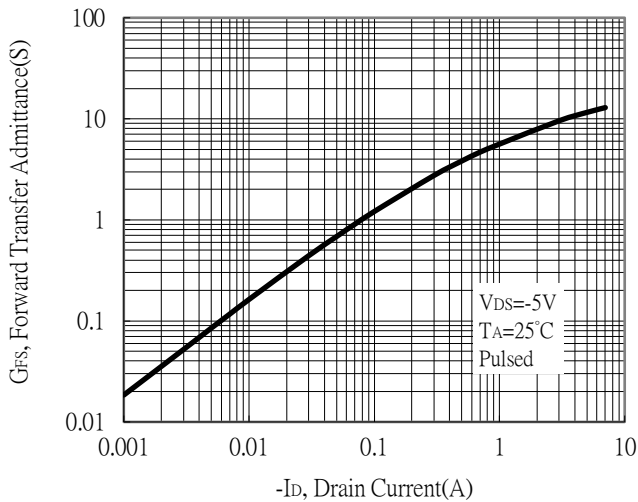
Capacitance vs Drain-to-Source Voltage



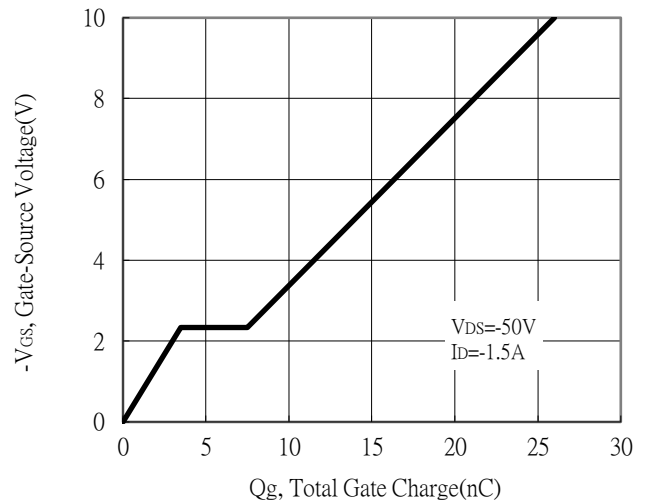
Threshold Voltage vs Junction Temperature



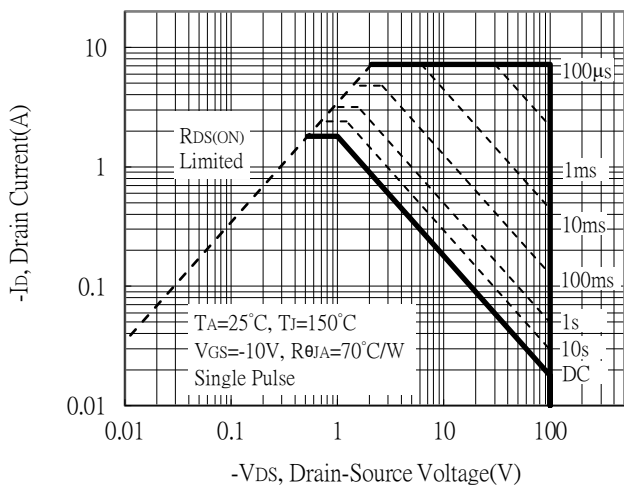
Forward Transfer Admittance vs Drain Current



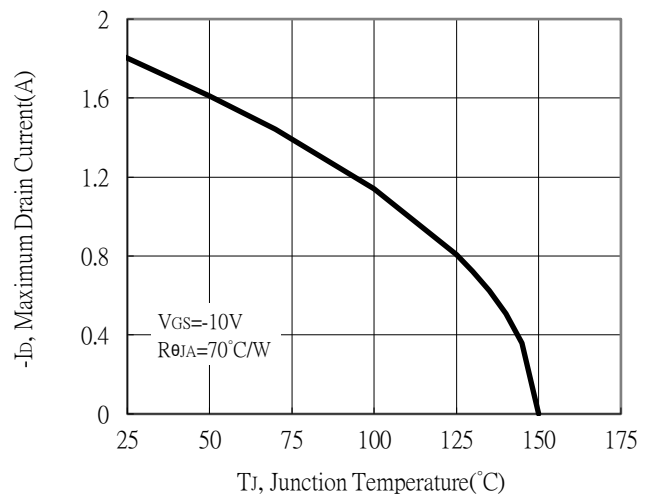
Gate Charge Characteristics



Maximum Safe Operating Area

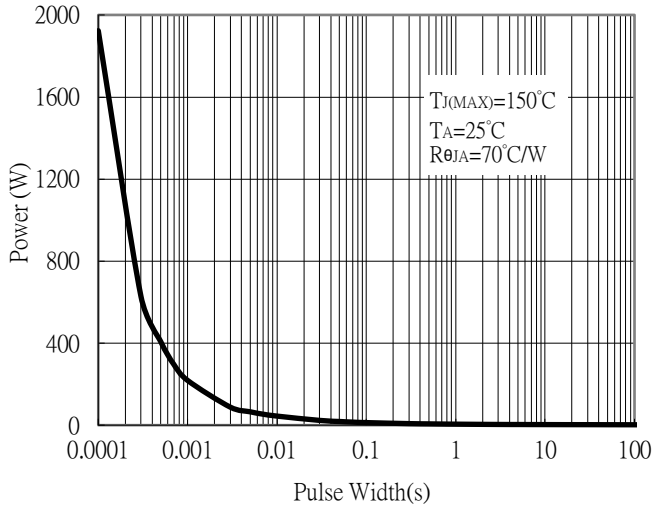


Maximum Drain Current vs Junction Temperature

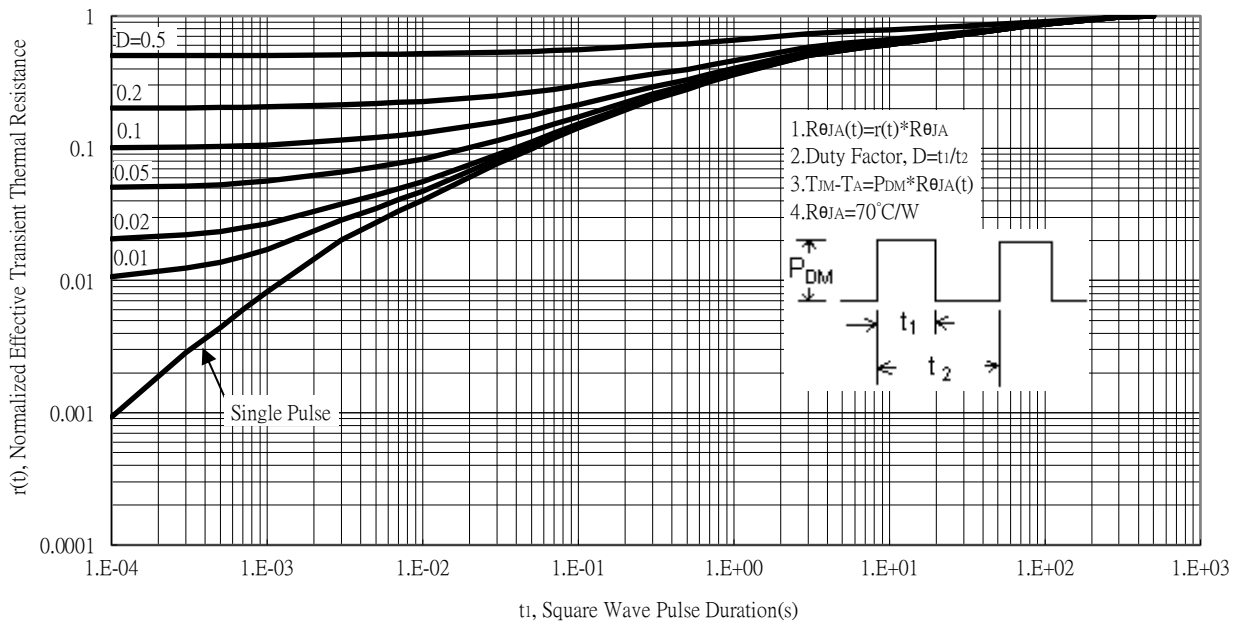


Typical Characteristics (Cont.) : Q2(P-channel)

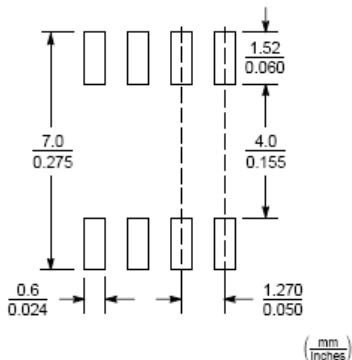
Single Pulse Power Rating, Junction to Ambient



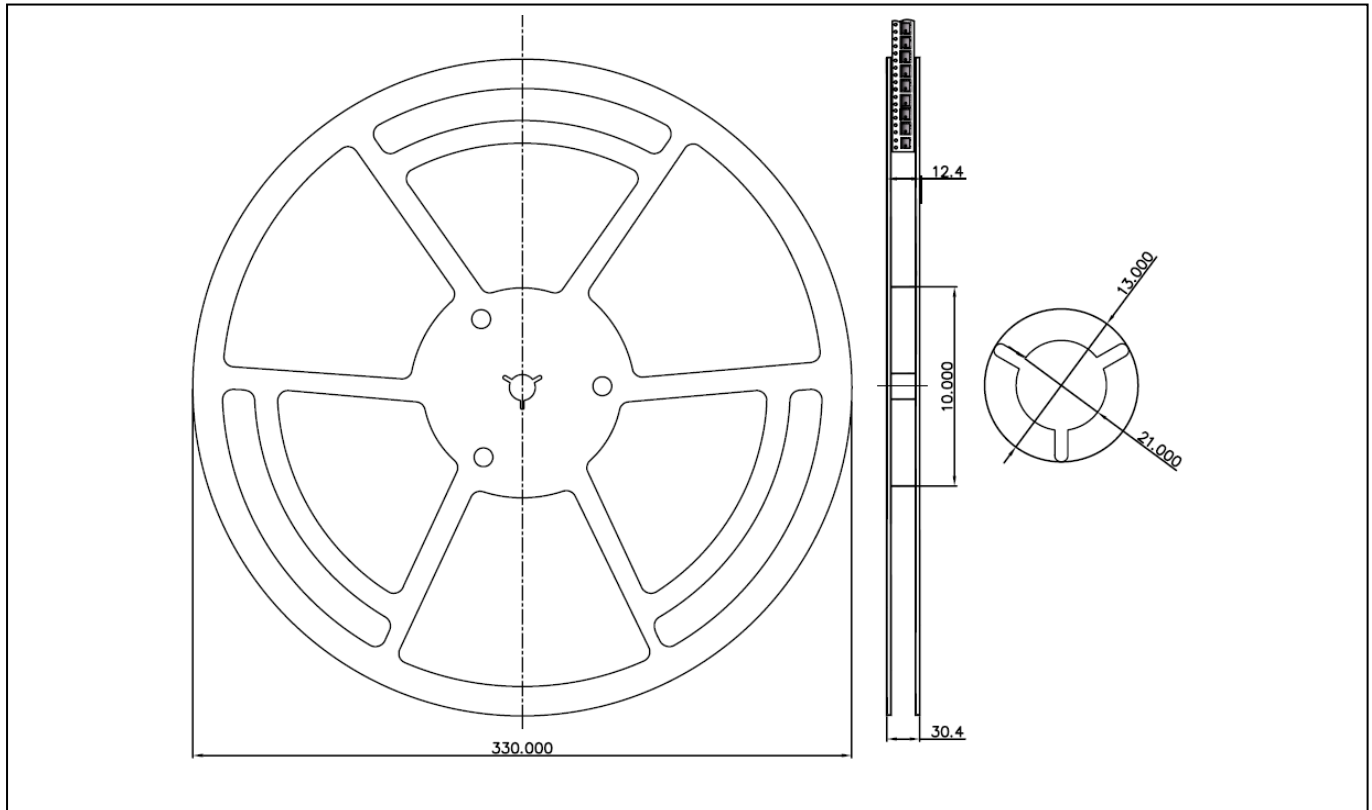
Transient Thermal Response Curves



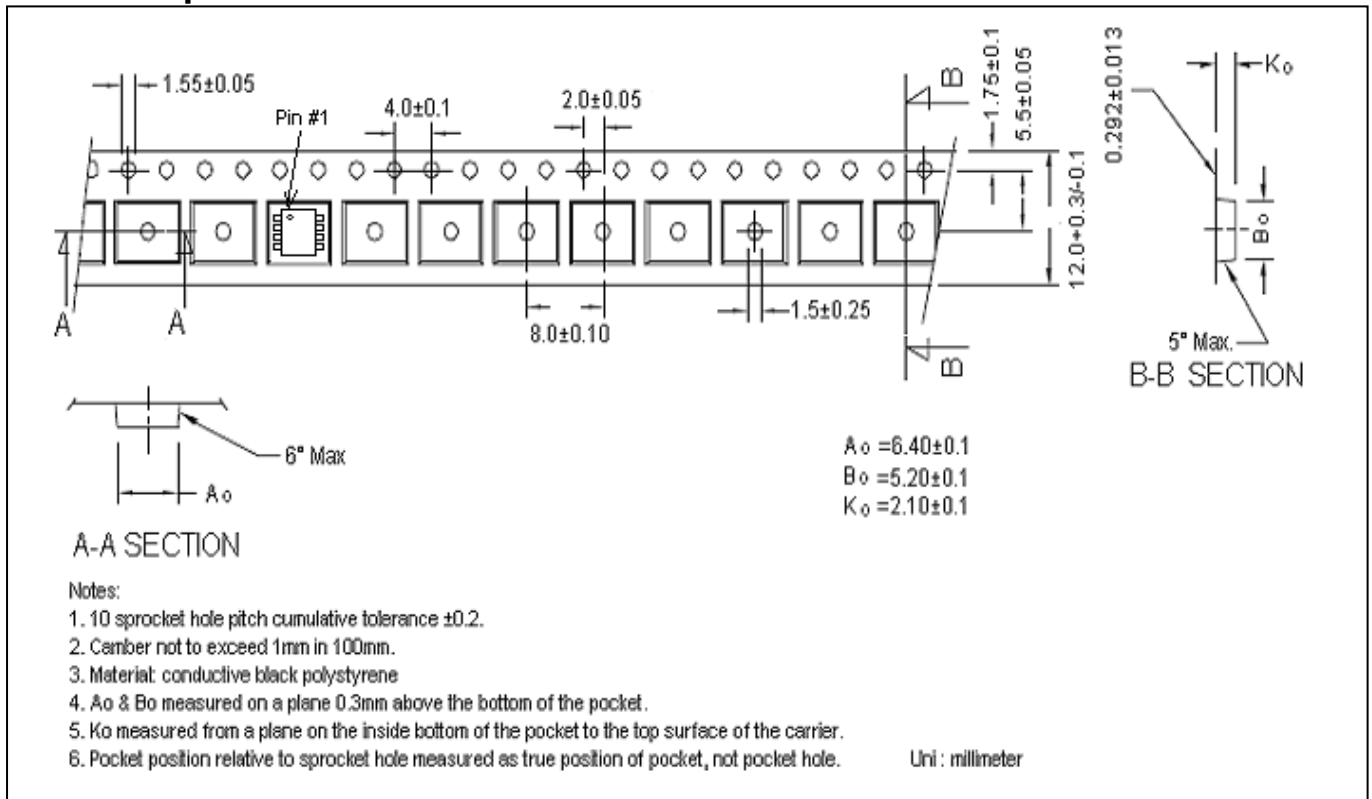
Recommended Soldering Footprint



Reel Dimension



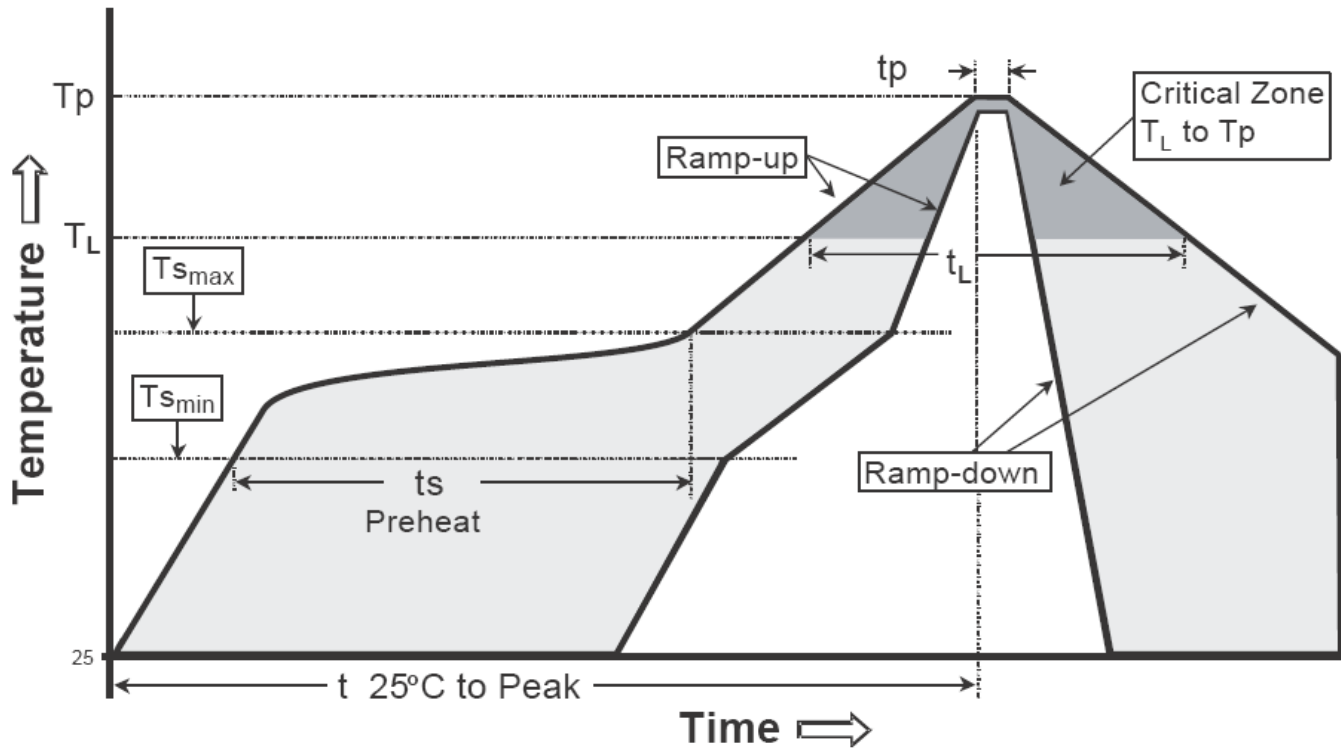
Carrier Tape Dimension



Recommended wave soldering condition

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

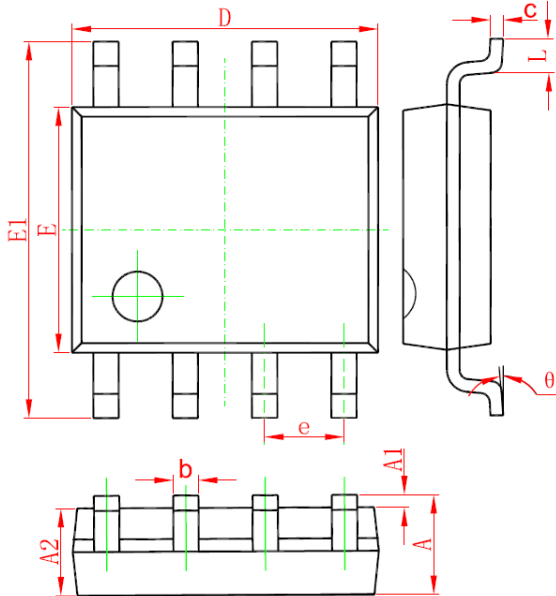
Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T _{smax} to T _p)	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T _{s min})	100°C	150°C
-Temperature Max(T _{s max})	150°C	200°C
-Time(t _{s min} to t _{s max})	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (T _L)	183°C	217°C
- Time (t _L)	60-150 seconds	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.

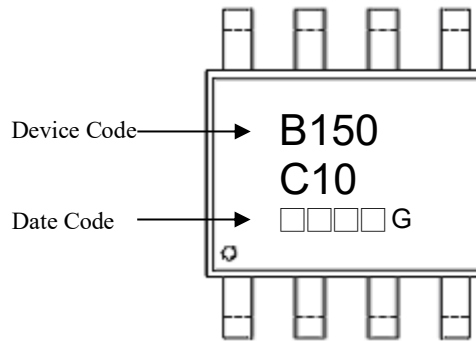
Note : All temperatures refer to topside of the package, measured on the package body surface.

SOP-8 Dimension



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

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

*: 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.

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