

N- AND P-Channel Enhancement Mode Power MOSFET

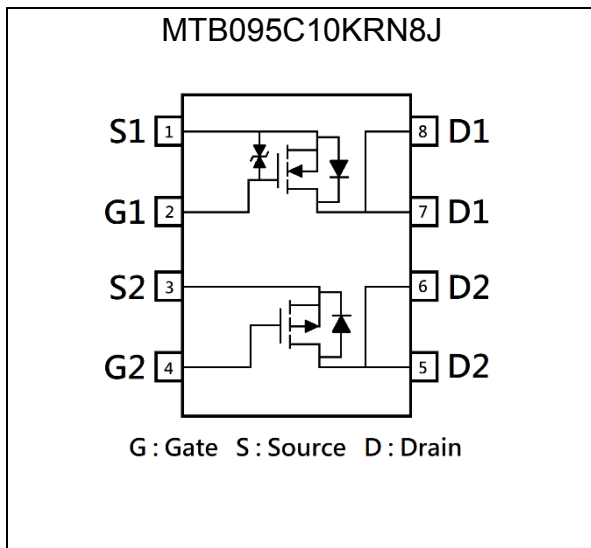
MTB095C10KRN8J

Features

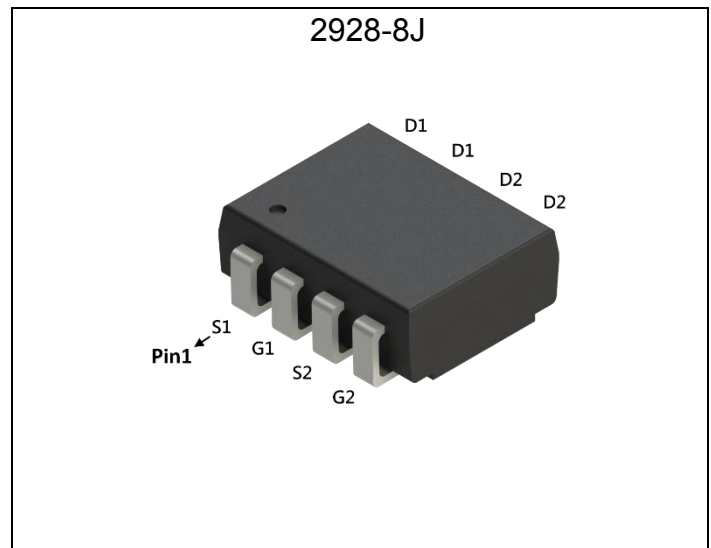
- Low On Resistance
- Low Gate Charge
- Fast Switching Characteristic
- N-channel with ESD protected gate

	N-CH	P-CH
BV_{DSS}	100V	-100V
$I_D@V_{GS}=(-)10V, T_C=25^{\circ}C$	4A	-3A
$I_D@V_{GS}=(-)10V, T_A=25^{\circ}C$	2A	-1.7A
$R_{DS(ON)}$ typ. @ $V_{GS}=(-)10V$	95mΩ	165mΩ
$R_{DS(ON)}$ typ. @ $V_{GS}=(-)5V$	125mΩ	190mΩ

Equivalent Circuit

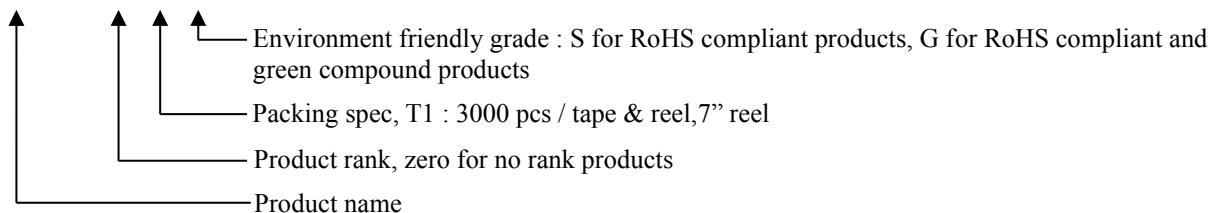


Outline



Ordering Information

Device	Package	Shipping
MTB095C10KRN8J-0-T1-G	2928-8J (RoHS compliant & Halogen-free package)	3000 pcs / Tape & Reel





Absolute Maximum Ratings (TA=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	4	A		
Continuous Drain Current @ V _{GS} =(-)10V, T _C =100°C	*a		2.5		-1.9	
Continuous Drain Current @ V _{GS} =(-)10V, T _A =25°C	*b		2		-1.7	
Continuous Drain Current @ V _{GS} =(-)10V, T _A =70°C	*b		1.6		-1.4	
Pulsed Drain Current	*c	I _{DM}	16	-12		
Continuous Body Diode Forward Current @ T _C =25°C	*a	I _S	3	-3		
Pulsed Body Diode Forward Current @ T _C =25°C	*a	I _{SM}	12	-12		
Total Power Dissipation	T _C =25°C	P _D	4	4.2	W	
	T _C =100°C		*a	1.6		1.7
	T _A =25°C		*b	1.1		1.3
	T _A =70°C		*b	0.7		0.8
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}	31	30	°C/W
Thermal Resistance, Junction-to-ambient	*b R _{θJA}	113	99	

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}	-	4	-	S	V _{DS} =5V, I _D =2A
I _{GSS}	-	-	±10	μA	V _{GS} =±16V, V _{DS} =0V
I _{DSS}	-	-	1		V _{DS} =80V, V _{GS} =0V
R _{DS(ON)}	-	95	125	mΩ	V _{GS} =10V, I _D =2A
	-	125	175		V _{GS} =5V, I _D =1A
Dynamic					
C _{iss}	-	260	-	pF	V _{DS} =50V, V _{GS} =0V, f=1MHz
C _{oss}	-	26	-		
C _{rss}	-	16	-		
R _g	-	4.3	-	Ω	f=1MHz
Q _g *1, 2	-	3	-	nC	V _{DS} =50V, I _D =2A, V _{GS} =5V
Q _g *1, 2	-	5.5	-		
Q _{gs} *1, 2	-	1	-		
Q _{gd} *1, 2	-	1	-		
t _{d(ON)} *1, 2	-	4.9	-	ns	V _{DS} =50V, I _D =2A, V _{GS} =10V, R _{GS} =6Ω
t _r *1, 2	-	17	-		
t _{d(OFF)} *1, 2	-	15	-		
t _f *1, 2	-	5.4	-		
Source-Drain Diode					
V _{SD} *1	-	0.85	1.2	V	I _S =2A, V _{GS} =0V
t _{rr}	-	16	-	ns	I _F =2A, dI _F /dt=100A/μs
Q _{rr}	-	11	-	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}	-	5	-	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)}	-	165	215	mΩ	V _{GS} =-10V, I _D =-1.5A
	-	190	270		V _{GS} =-5V, I _D =-1A
Dynamic					
C _{iss}	-	709	-	pF	V _{DS} =-50V, V _{GS} =0V, f=1MHz
C _{oss}	-	38	-		
C _{rss}	-	33	-		
R _g	-	4.6	-	Ω	f=1MHz
Q _g *1,2	-	8.2	-		V _{DS} =-50V, I _D =-1.5A, V _{GS} =-5V
Q _g *1,2	-	15	-	nC	V _{DS} =-50V, I _D =-1.5A, V _{GS} =-10V
Q _{gs} *1,2	-	2	-		
Q _{gd} *1,2	-	3	-		
t _{d(ON)} *1,2	-	8	-	ns	V _{DS} =-50V, I _D =-1.5A, V _{GS} =-10V, R _{GS} =3Ω
t _r *1,2	-	18	-		
t _{d(OFF)} *1,2	-	33	-		
t _f *1,2	-	15	-		
Source-Drain Diode					
V _{SD} *1	-	-0.8	-1.2	V	I _S =-1.5A, V _{GS} =0V
t _{rr}	-	14	-	ns	I _F =-1.5A, dI _F /dt=100A/μs
Q _{rr}	-	21	-	nC	

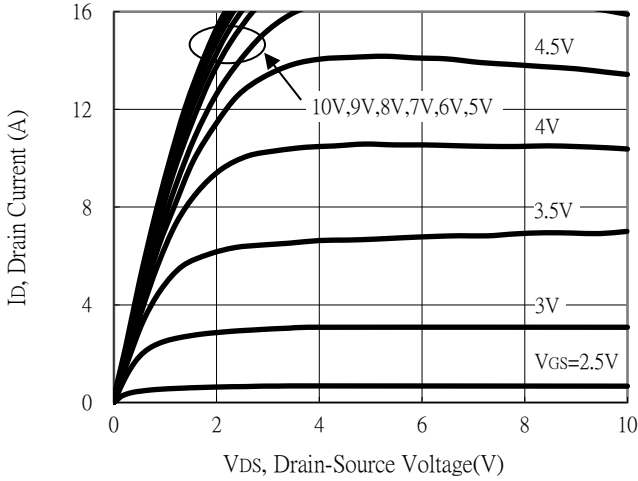
Note:

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

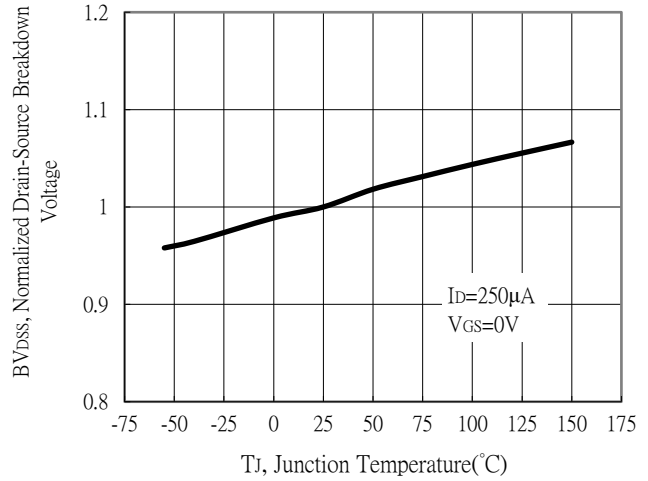
*2. Independent of operating temperature

Typical Characteristics : Q1(N-channel)

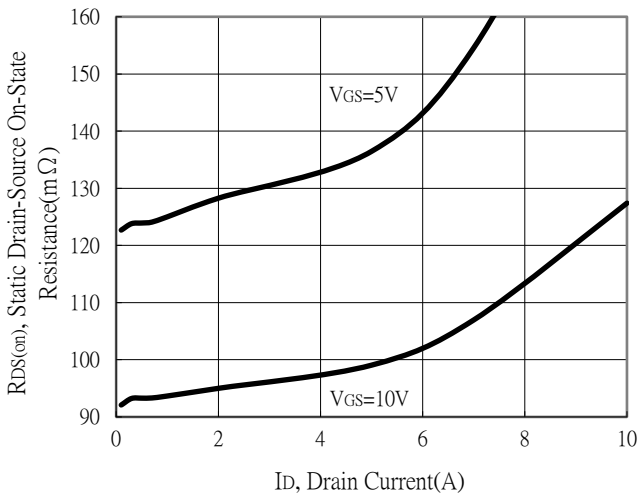
Typical Output Characteristics



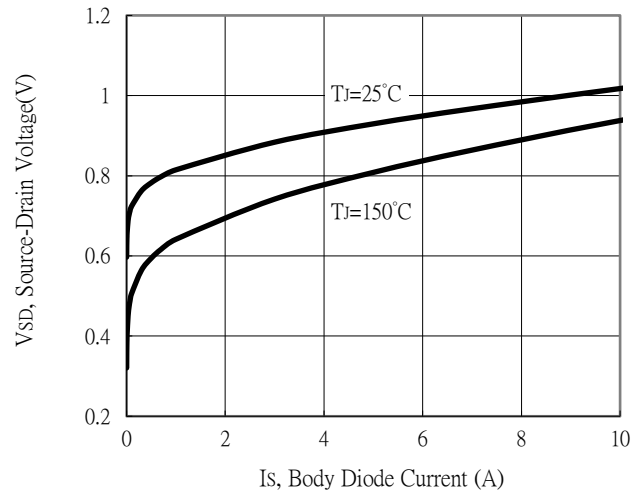
Breakdown Voltage vs Ambient Temperature



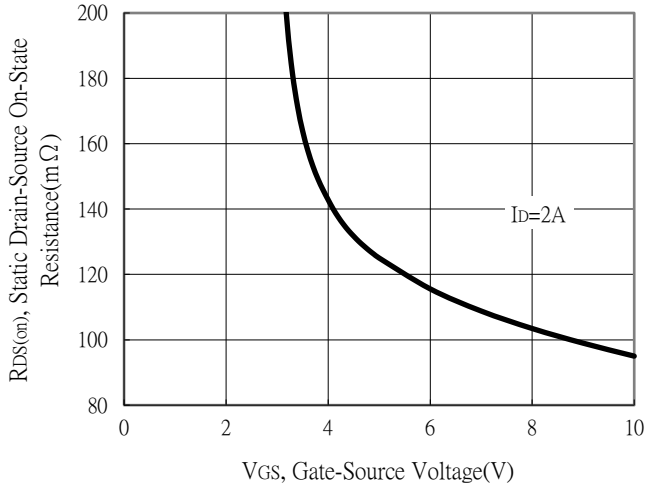
Static Drain-Source On-State resistance vs Drain Current



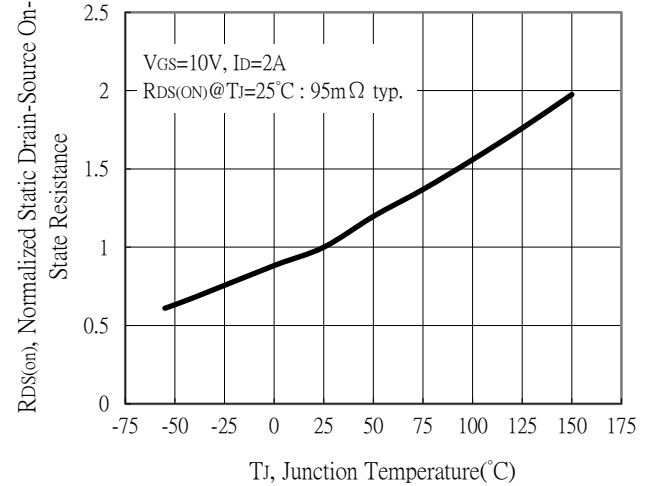
Body Diode Current vs Source-Drain Voltage



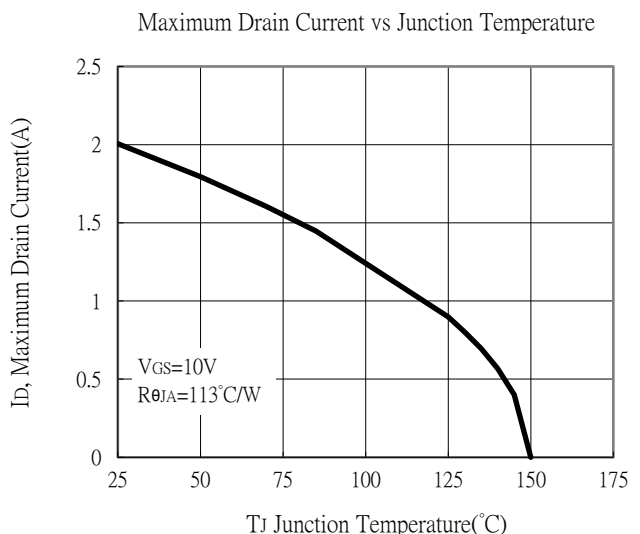
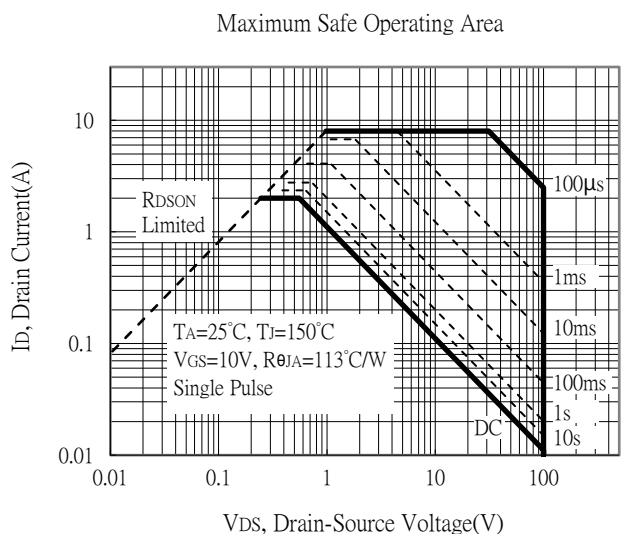
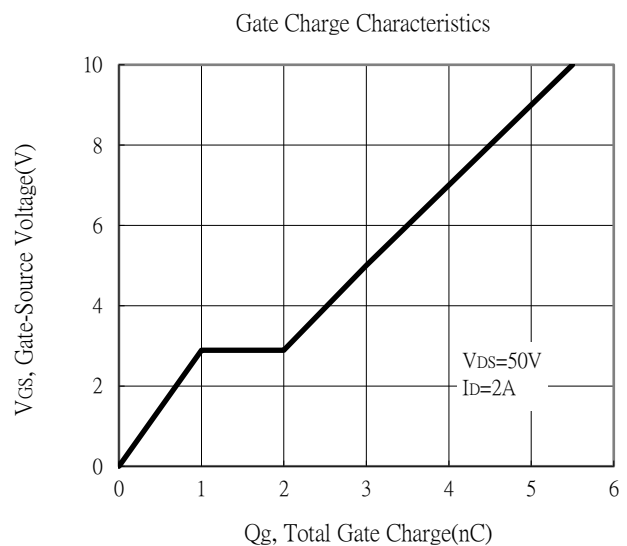
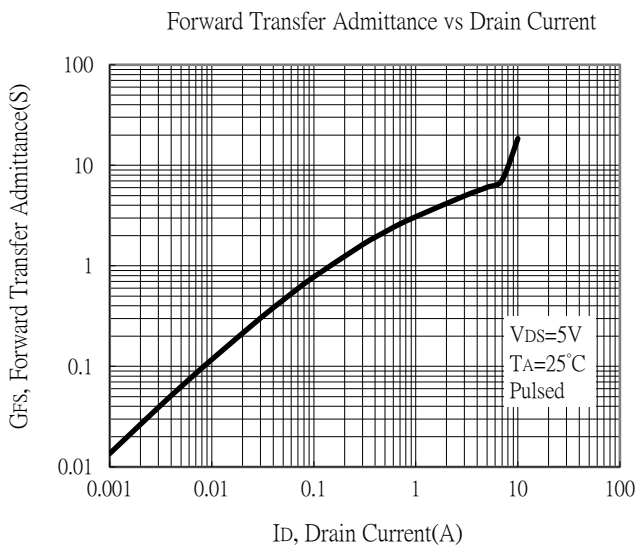
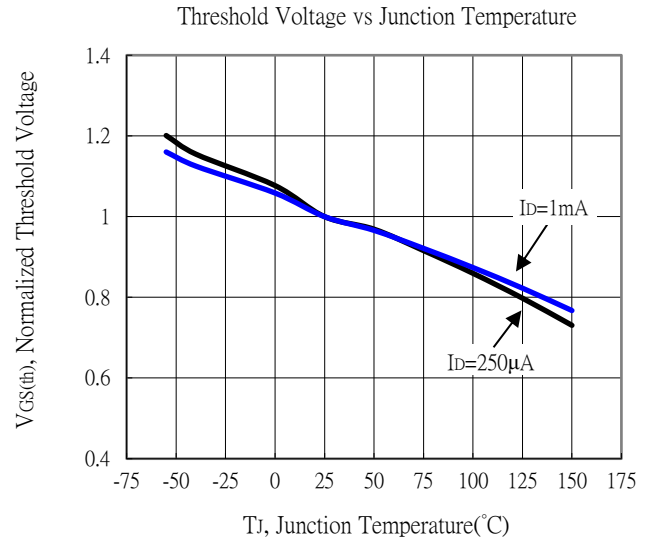
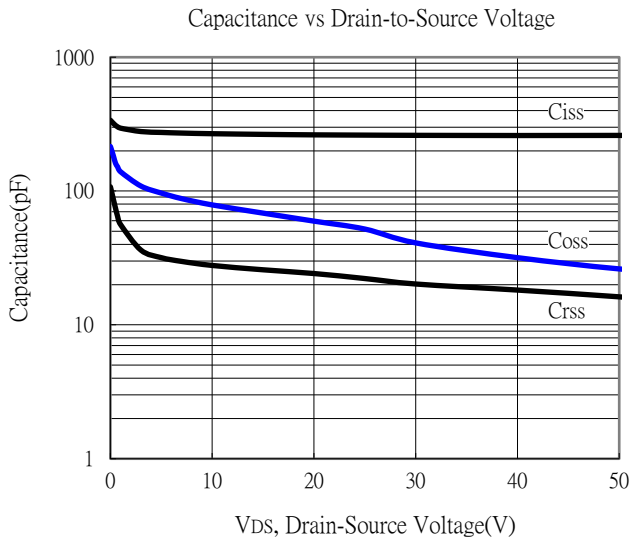
Static Drain-Source On-State Resistance vs Gate-Source Voltage



Drain-Source On-State Resistance vs Junction Temperature



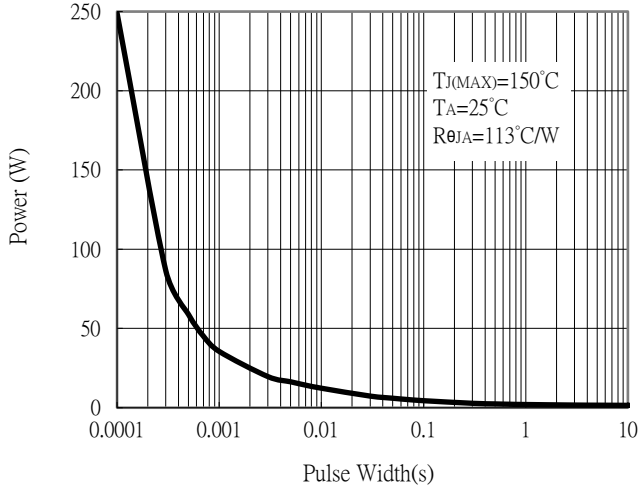
Typical Characteristics (Cont.) : Q1(N-channel)



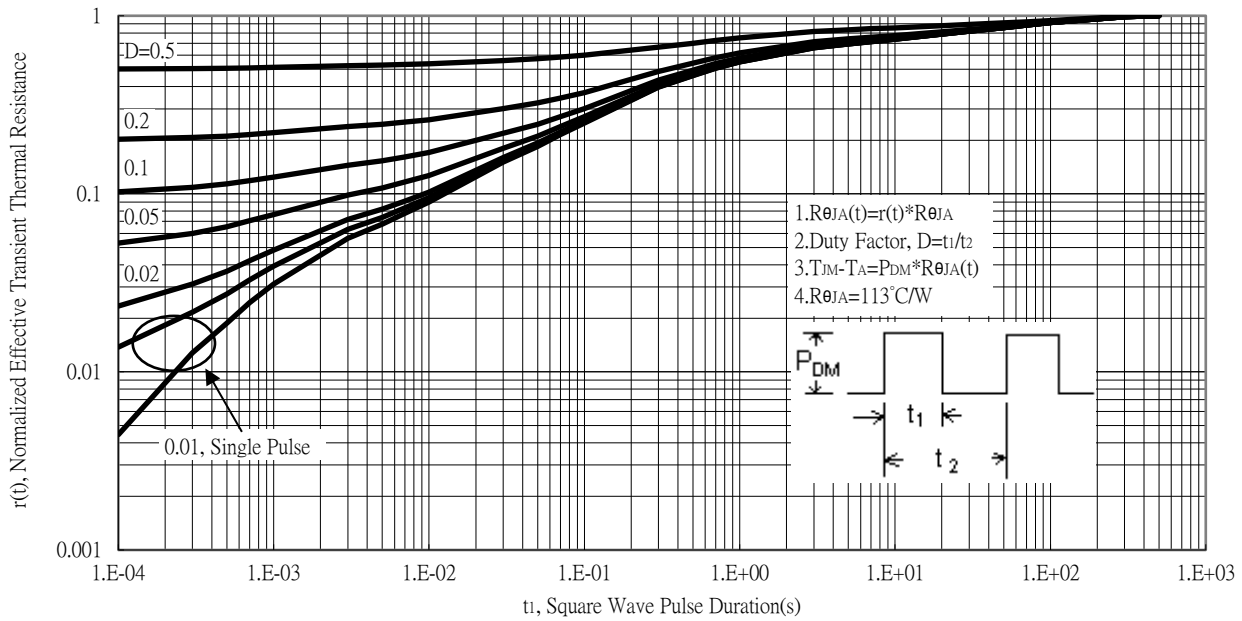


Typical Characteristics (Cont.) : Q1(N-channel)

Single Pulse Power Rating, Junction to Ambient

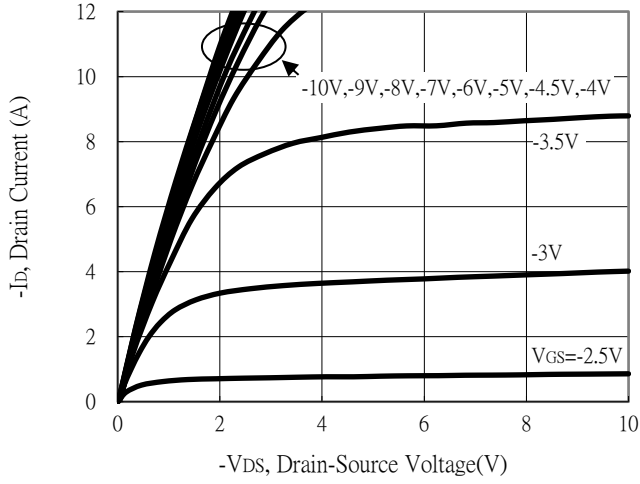


Transient Thermal Response Curves

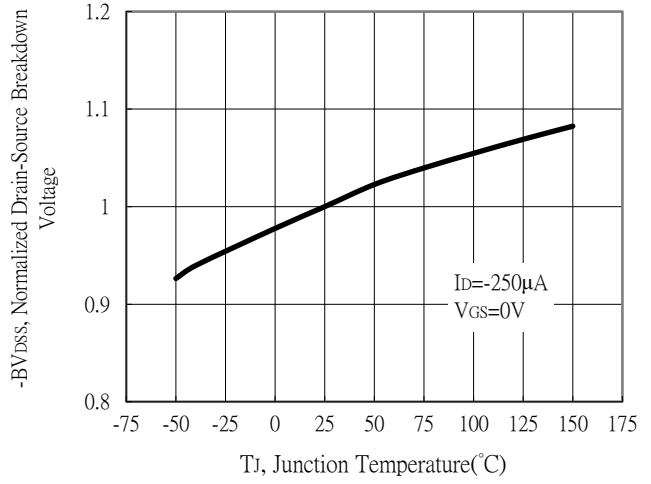


Typical Characteristics : Q2(P-channel)

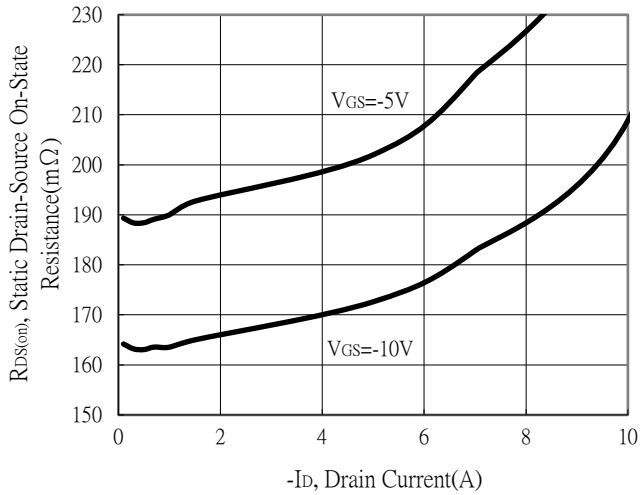
Typical Output Characteristics



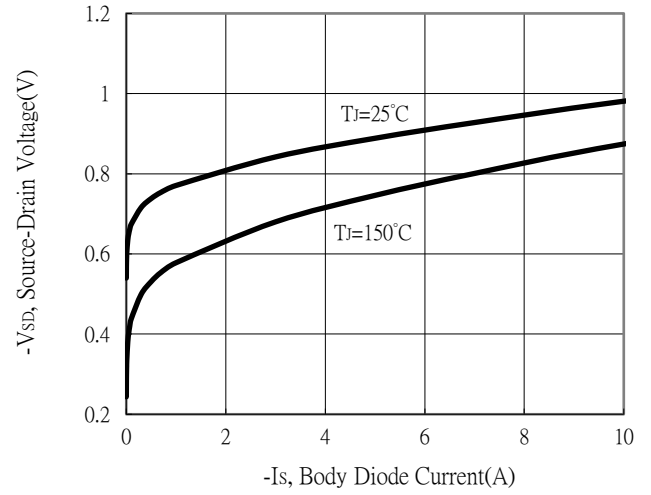
Breakdown Voltage vs Ambient Temperature



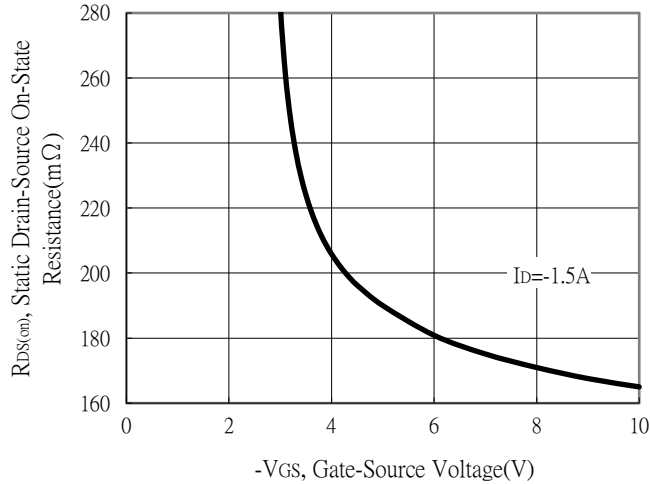
Static Drain-Source On-State resistance vs Drain Current



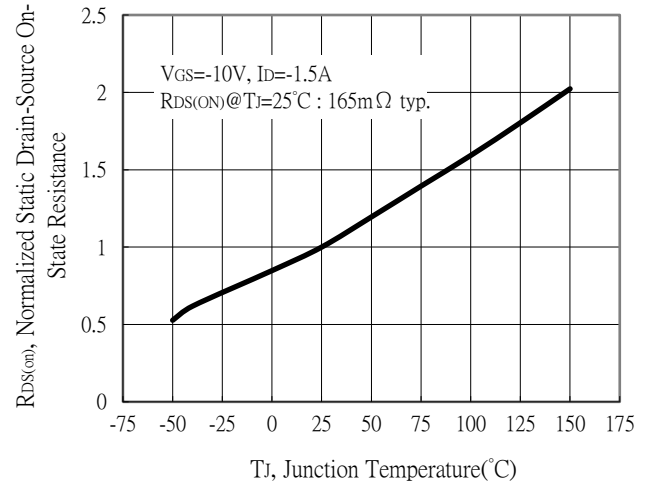
Body Diode Current vs Source-Drain Voltage



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

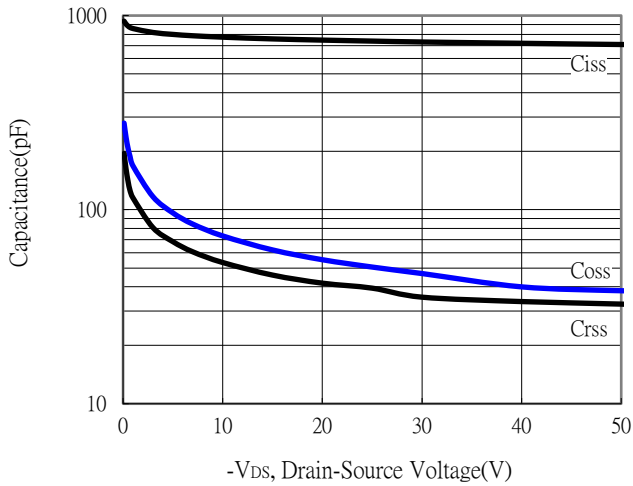


Drain-Source On-State Resistance vs Junction Temperature

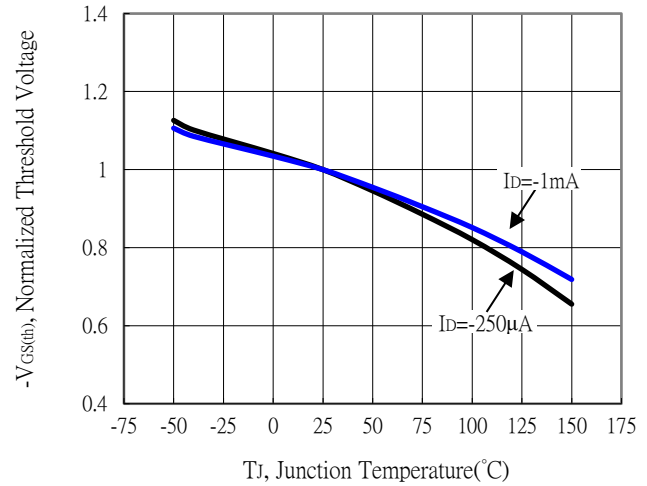


Typical Characteristics (Cont.) : Q2(P-channel)

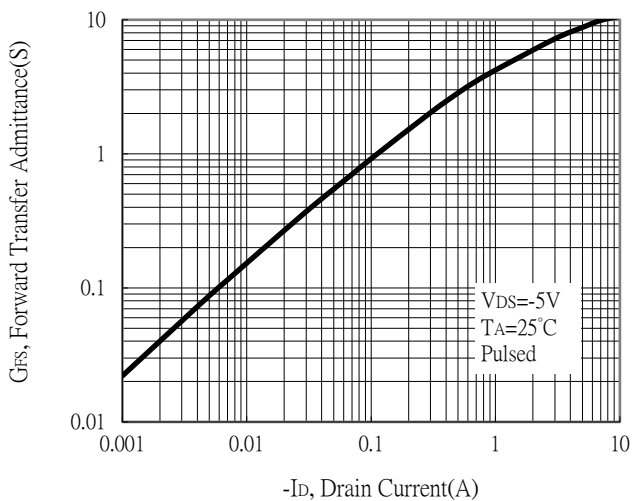
Capacitance vs Drain-to-Source Voltage



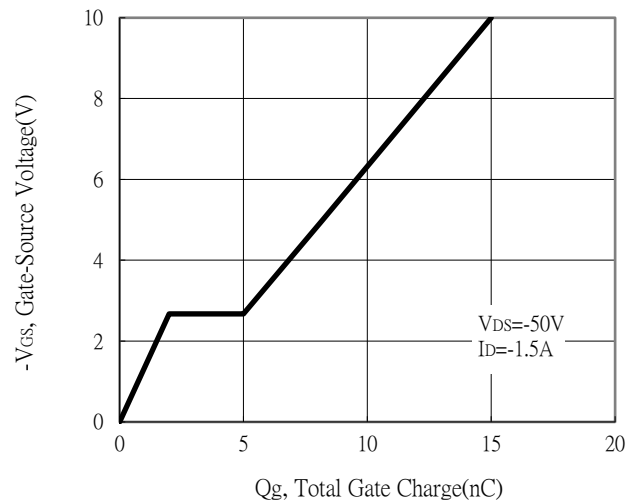
Threshold Voltage vs Junction Temperature



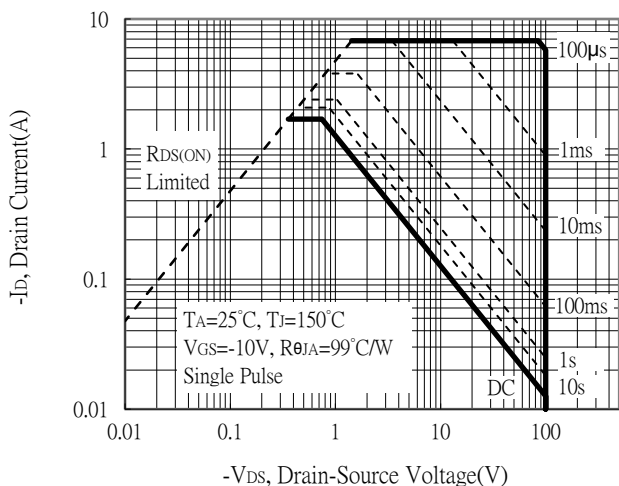
Forward Transfer Admittance vs Drain Current



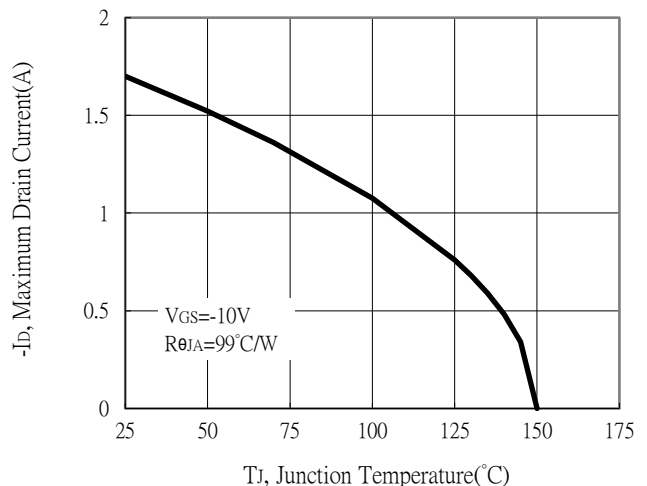
Gate Charge Characteristics



Maximum Safe Operating Area

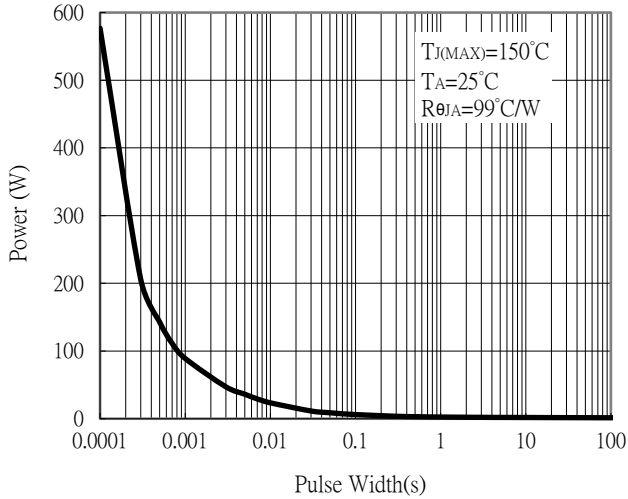


Maximum Drain Current vs Junction Temperature

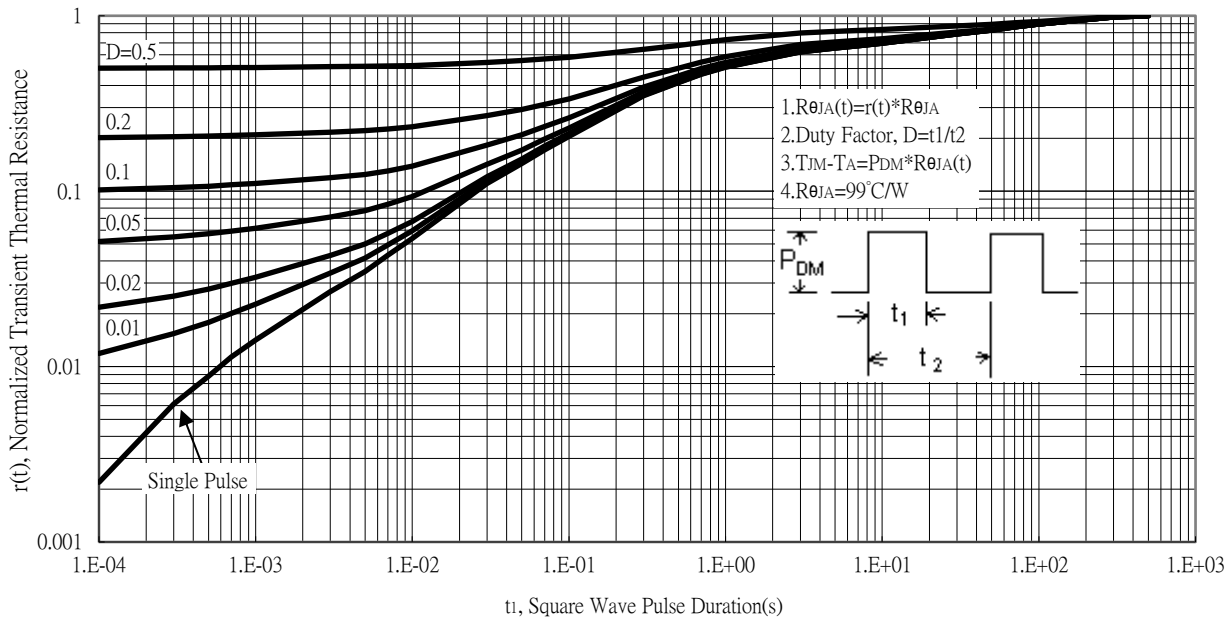


Typical Characteristics (Cont.) : Q2(P-channel)

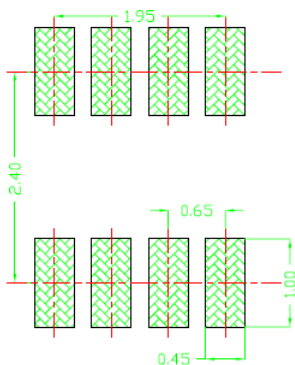
Single Pulse Power Rating, Junction to Ambient



Transient Thermal Response Curves

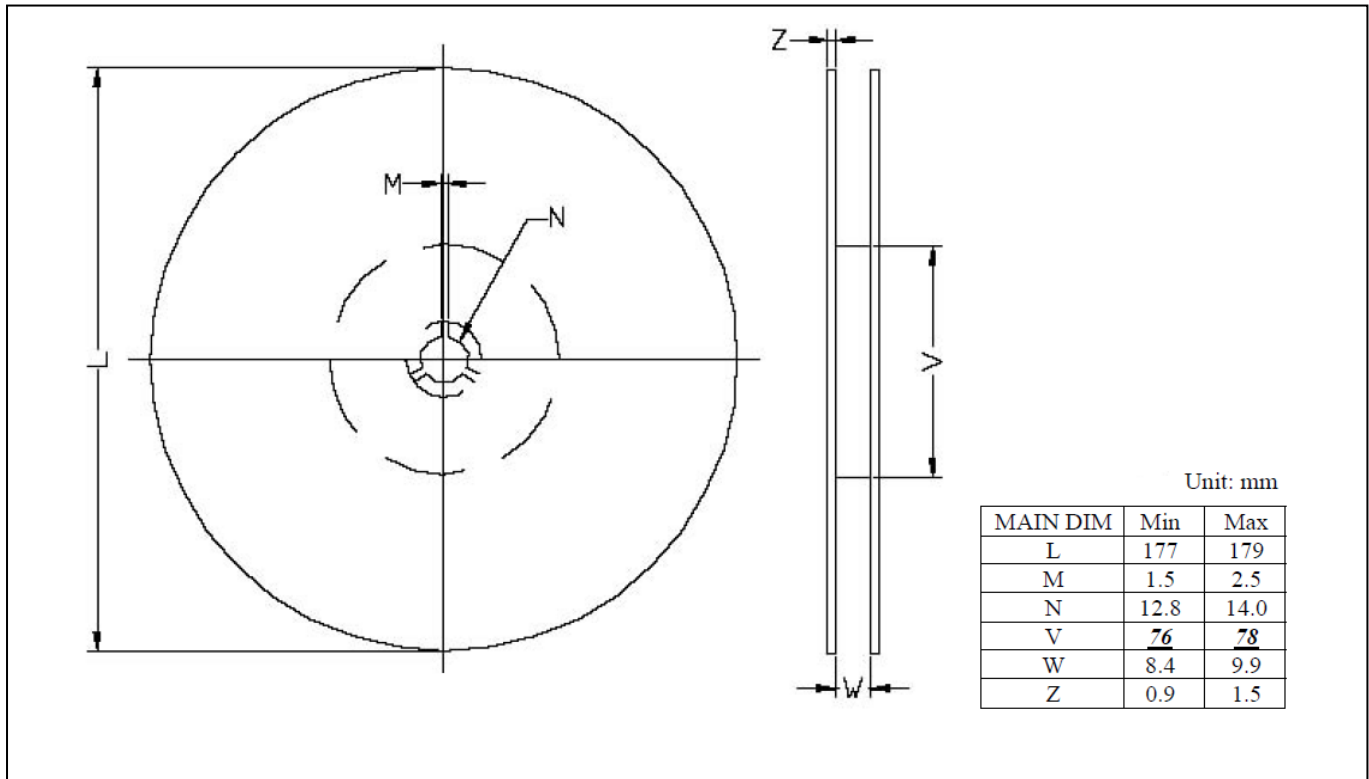


Recommended Soldering Footprint

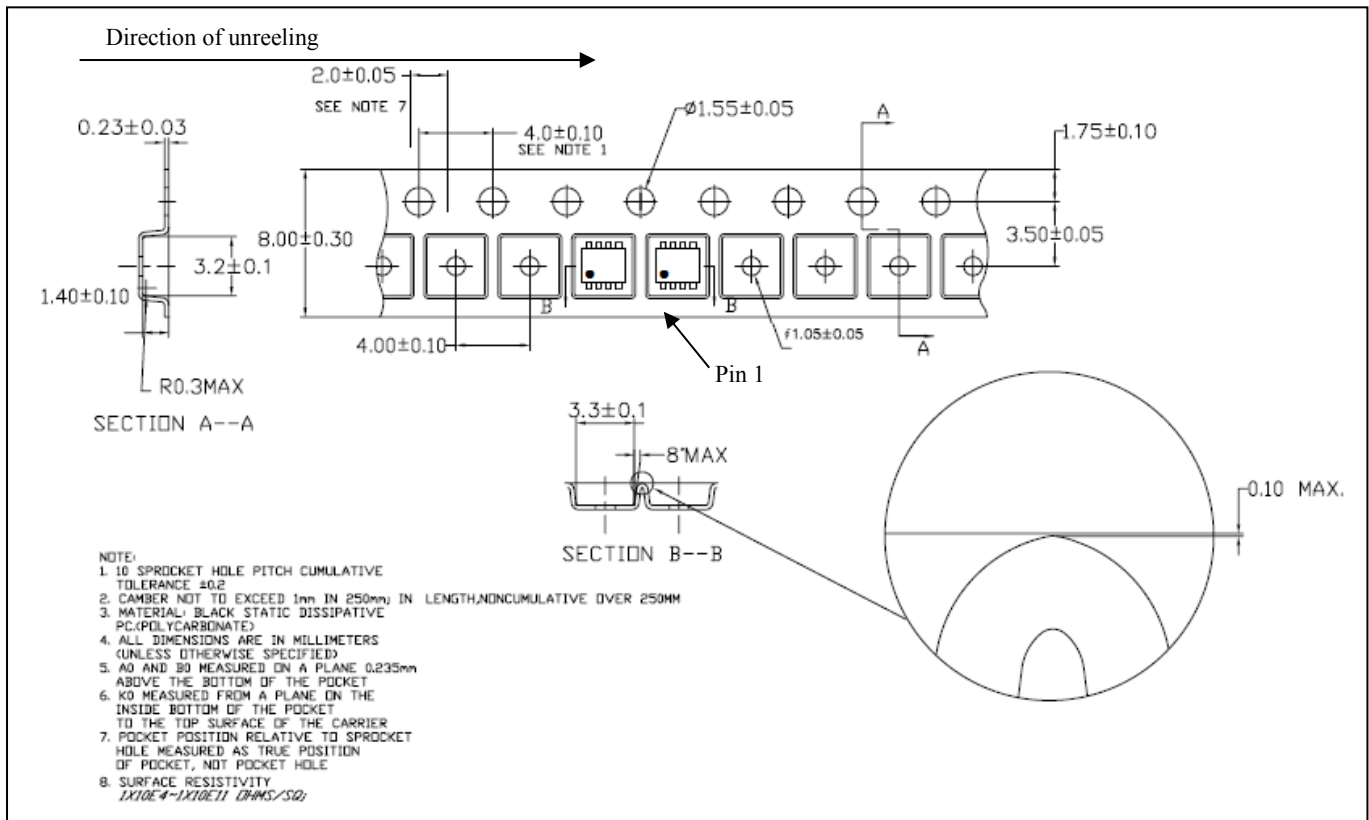


unit : mm

Reel Dimension



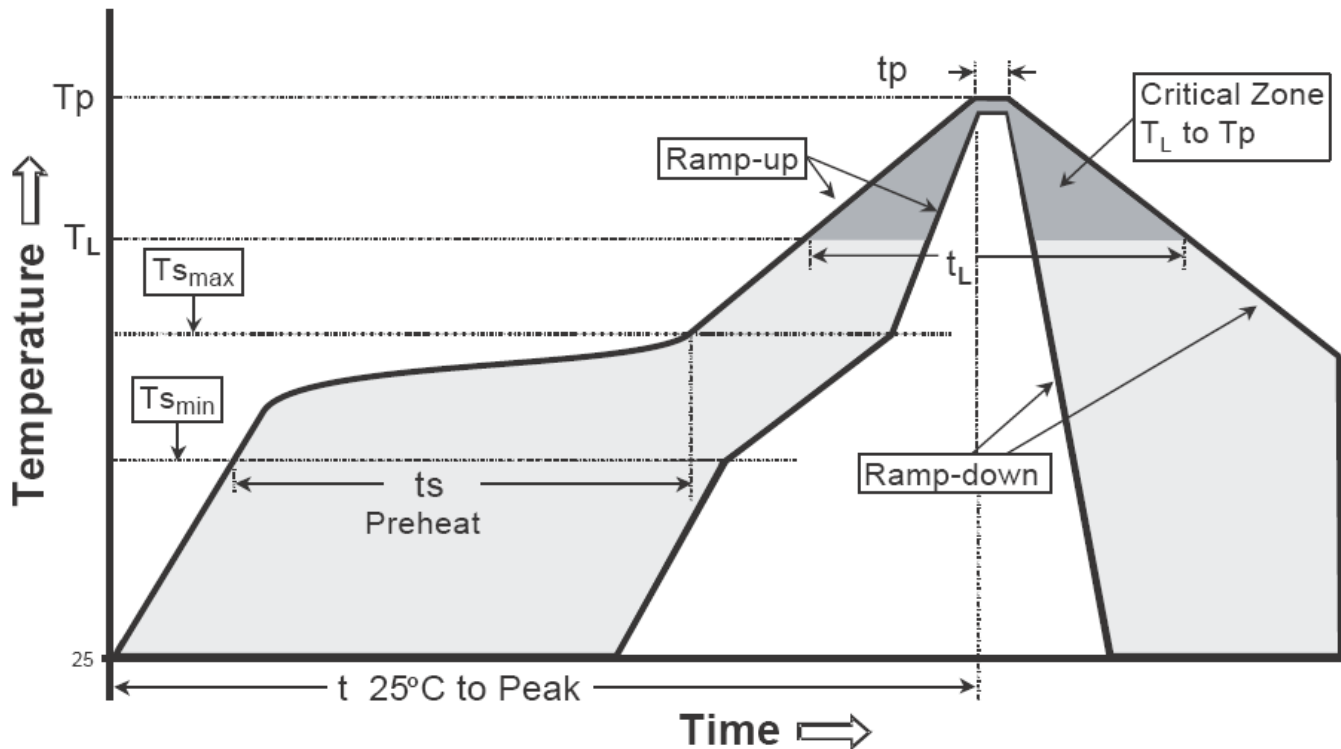
Carrier Tape Dimension



Recommended wave soldering condition

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

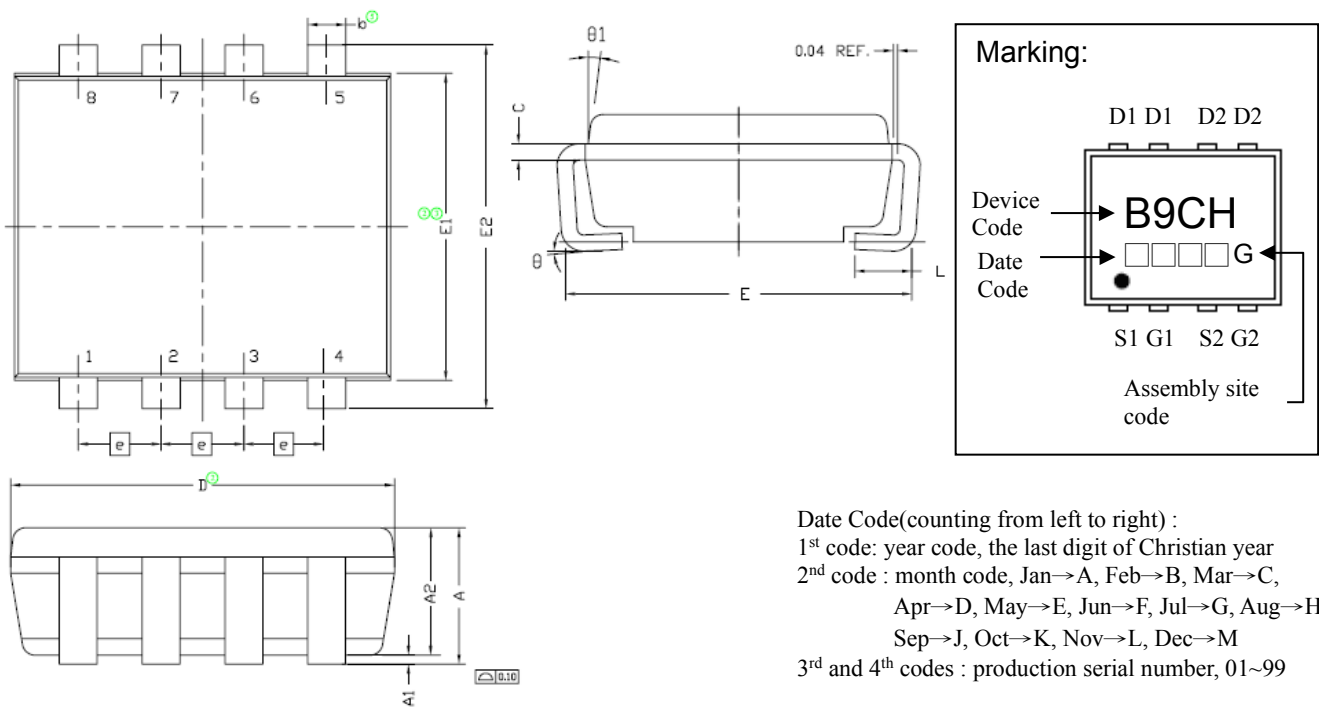
Recommended temperature profile for IR reflow



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.

2928-8J Dimension



Marking:

D1 D1 D2 D2

Device Code → **B9CH**

Date Code → □ □ □ □ G

S1 G1 S2 G2

Assembly site code

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

8-Lead 2928-8J Plastic Package
 CYStek Package Code: N8J

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.935	1.100	0.0368	0.0433	E1	2.300	2.500	0.0906	0.0984
A1	0.010	0.100	0.0004	0.0039	E2	2.650	3.050	0.1043	0.1201
A2	0.925	1.000	0.0364	0.0394	e	0.65	BSC	0.0256	BSC
b	0.250	0.400	0.0098	0.0157	L	0.300	0.600	0.0118	0.0236
c	0.100	0.200	0.0039	0.0079	θ	0°	8°	0°	8°
D	2.950	3.100	0.1161	0.1220	θ1	7°	TYP	7°	TYP
E	2.500	3.000	0.0984	0.1181					

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