

**N- AND P-Channel Enhancement Mode Power MOSFET**

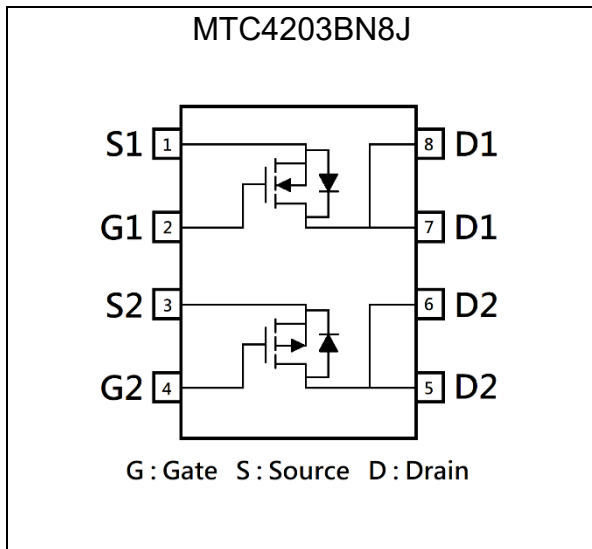
# MTC4203BN8J

**Features**

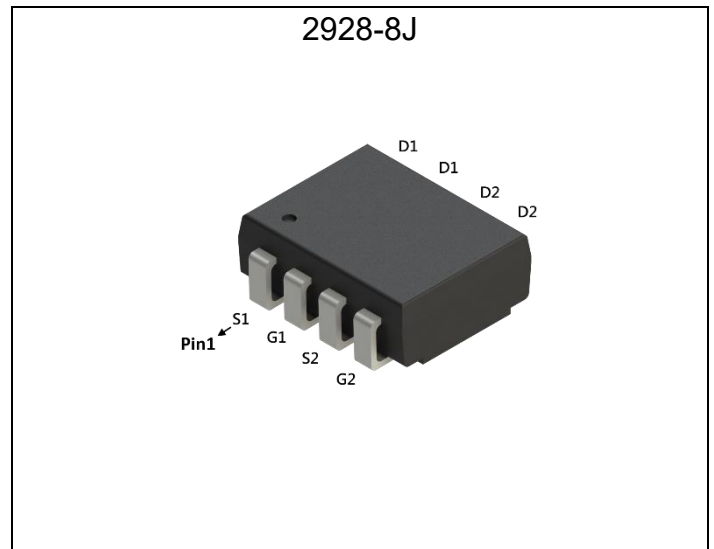
- Simple drive requirement
- Low On Resistance
- Low Gate Charge
- Fast switching speed

	N-CH	P-CH
$BV_{DSS}$	30V	-30V
$I_D@V_{GS}=(-)10V, T_C=25^\circ C$	6.8A	-6.7A
$I_D@V_{GS}=(-)10V, T_A=25^\circ C$	4A	-3.9A
$R_{DS(ON) typ.}@V_{GS}=(-)10V$	30mΩ	39mΩ
$R_{DS(ON) typ.}@V_{GS}=(-)5V$	54mΩ	56mΩ

**Equivalent Circuit**

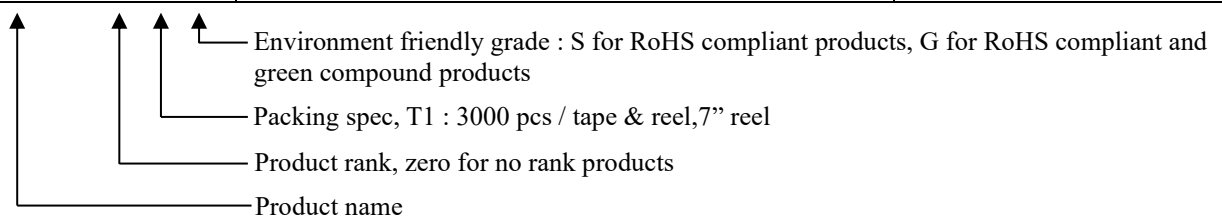


**Outline**



**Ordering Information**

Device	Package	Shipping
MTC4203BN8J-0-T1-G	2928-8J (Pb-free lead plating and 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 <sub>DS</sub>	30	-30	V		
Gate-Source Voltage	V <sub>GS</sub>	±20	±20			
Continuous Drain Current @ V <sub>GS</sub> =(-)10V, T <sub>C</sub> =25°C	*a	I <sub>D</sub>	6.8	-6.7	A	
Continuous Drain Current @ V <sub>GS</sub> =(-)10V, T <sub>C</sub> =100°C	*a		4.3	-4.2		
Continuous Drain Current @ V <sub>GS</sub> =(-)10V, T <sub>A</sub> =25°C	*b		4	-3.9		
Continuous Drain Current @ V <sub>GS</sub> =(-)10V, T <sub>A</sub> =70°C	*b		3.2	-3.1		
Pulsed Drain Current	*c		I <sub>DM</sub>	27		-27
Continuous Body Diode Forward Current @ T <sub>C</sub> =25°C	*a	I <sub>S</sub>	2.5	-3.1		
Pulsed Body Diode Forward Current @ T <sub>C</sub> =25°C	*a	I <sub>SM</sub>	10	-12.4		
Avalanche Current @ L=0.1mH		I <sub>AS</sub>	8	-12		
Avalanche Energy @ L=0.5mH		E <sub>AS</sub>	6	12		mJ
Total Power Dissipation	T <sub>C</sub> =25°C	*a	P <sub>D</sub>	3.1	3.8	W
	T <sub>C</sub> =100°C	*a		1.2	1.5	
	T <sub>A</sub> =25°C	*b		1.1	1.3	
	T <sub>A</sub> =70°C	*b		0.7	0.8	
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55~+150		°C		

**Thermal Data**

Parameter	Symbol	Steady State		Unit
Thermal Resistance, Junction-to-case	R <sub>θJC</sub>	40	33	°C/W
Thermal Resistance, Junction-to-ambient	*b R <sub>θJA</sub>	109	97	

Note:

- \*a. The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=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<sub>θJA</sub> is measured with the device mounted on 1 in<sup>2</sup> FR-4 board with 2 oz. copper, in a still air environment with T<sub>A</sub>=25°C. The power dissipation P<sub>D</sub> is based on R<sub>θJA</sub> 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<sub>J(MAX)</sub>=150°C. Ratings are based on low frequency and low duty cycles to keep initial T<sub>J</sub>=25°C.



**N-Channel Electrical Characteristics (T<sub>A</sub>=25°C, unless otherwise specified)**

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
BV <sub>DSS</sub>	30	-	-	V	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA
V <sub>GS(th)</sub>	1.3	-	2.5		V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA
G <sub>FS</sub>	-	2.4	-	S	V <sub>DS</sub> =10V, I <sub>D</sub> =3A
I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V
I <sub>DSS</sub>	-	-	1	μA	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V
R <sub>DS(ON)</sub>	-	30	40	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =5A
	-	54	80		V <sub>GS</sub> =5V, I <sub>D</sub> =4A
<b>Dynamic</b>					
C <sub>iss</sub>	-	230	-	pF	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz
C <sub>oss</sub>	-	40	-		
C <sub>rss</sub>	-	36	-		
R <sub>g</sub>	-	0.8	-	Ω	f=1MHz
Q <sub>g</sub> *1, 2	-	3.1	-	nC	V <sub>DS</sub> =15V, I <sub>D</sub> =2A, V <sub>GS</sub> =4.5V
Q <sub>g</sub> *1, 2	-	6	-		
Q <sub>gs</sub> *1, 2	-	1.1	-		
Q <sub>gd</sub> *1, 2	-	1.5	-		
t <sub>d(ON)</sub> *1, 2	-	4.5	-	ns	V <sub>DS</sub> =15V, I <sub>D</sub> =2A, V <sub>GS</sub> =10V, R <sub>GS</sub> =1Ω
t <sub>r</sub> *1, 2	-	16	-		
t <sub>d(OFF)</sub> *1, 2	-	13	-		
t <sub>f</sub> *1, 2	-	4.5	-		
<b>Source-Drain Diode</b>					
V <sub>SD</sub> *1	-	0.89	1.2	V	I <sub>S</sub> =4.5A, V <sub>GS</sub> =0V
t <sub>rr</sub>	-	7	-	ns	I <sub>F</sub> =2A, dI <sub>F</sub> /dt=100A/μs
Q <sub>rr</sub>	-	3.5	-	nC	

Note:

- \*1. Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%
- \*2. Independent of operating temperature



**P-Channel Electrical Characteristics (T<sub>A</sub>=25°C, unless otherwise specified)**

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
BV <sub>DSS</sub>	-30	-	-	V	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA
V <sub>GS(th)</sub>	-1.3	-	-2.5		V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA
G <sub>FS</sub>	-	4.3	-	S	V <sub>DS</sub> =-10V, I <sub>D</sub> =-2A
I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V
I <sub>DSS</sub>	-	-	-1	μA	V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V
R <sub>DS(ON)</sub>	-	39	52	mΩ	V <sub>GS</sub> =-10V, I <sub>D</sub> =-6A
	-	56	80		V <sub>GS</sub> =-5V, I <sub>D</sub> =-4A
<b>Dynamic</b>					
C <sub>iss</sub>	-	640	-	pF	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1MHz
C <sub>oss</sub>	-	80	-		
C <sub>rss</sub>	-	75	-		
R <sub>g</sub>	-	12	-	Ω	f=1MHz
Q <sub>g</sub> *1, 2	-	7.5	-	nC	V <sub>DS</sub> =-15V, I <sub>D</sub> =-2A, V <sub>GS</sub> =-4.5V
Q <sub>g</sub> *1, 2	-	15	-		
Q <sub>gs</sub> *1, 2	-	2	-		
Q <sub>gd</sub> *1, 2	-	3.3	-		
t <sub>d(ON)</sub> *1, 2	-	7.5	-	ns	V <sub>DS</sub> =-15V, I <sub>D</sub> =-2A, V <sub>GS</sub> =-10V, R <sub>Gs</sub> =1Ω
t <sub>r</sub> *1, 2	-	25	-		
t <sub>d(OFF)</sub> *1, 2	-	36	-		
t <sub>f</sub> *1, 2	-	7.5	-		
<b>Source-Drain Diode</b>					
V <sub>SD</sub> *1	-	-0.89	-1.2	V	I <sub>S</sub> =-4.5A, V <sub>GS</sub> =0V
t <sub>rr</sub>	-	9	-	ns	I <sub>F</sub> =-4.5A, dI <sub>F</sub> /dt=100A/μs
Q <sub>rr</sub>	-	4.5	-	nC	

Note:

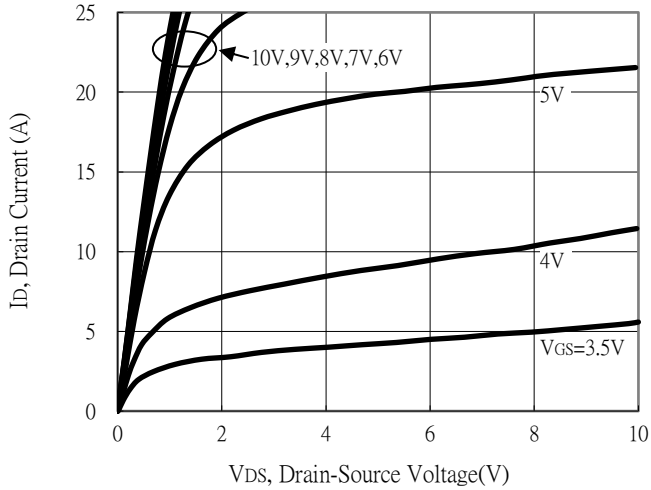
\*1. Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

\*2. Independent of operating temperature

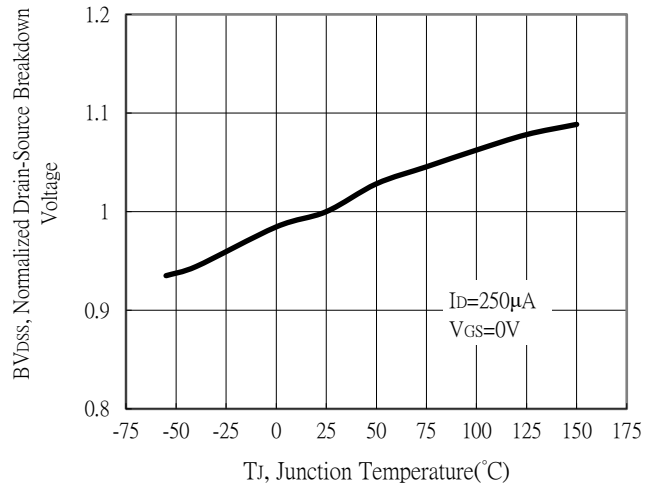


### Typical Characteristics : Q1(N-channel)

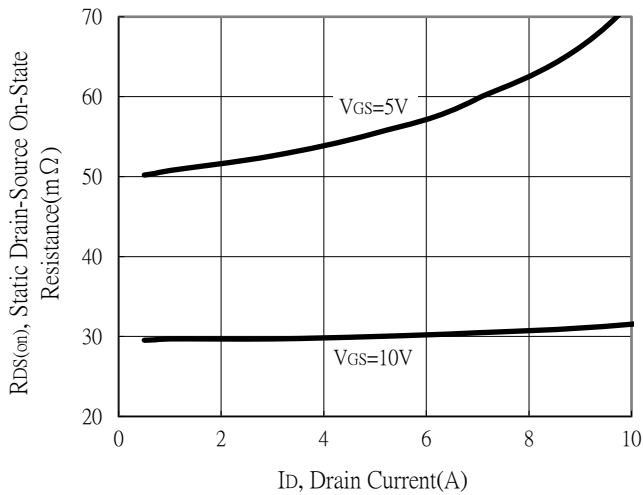
Typical Output Characteristics



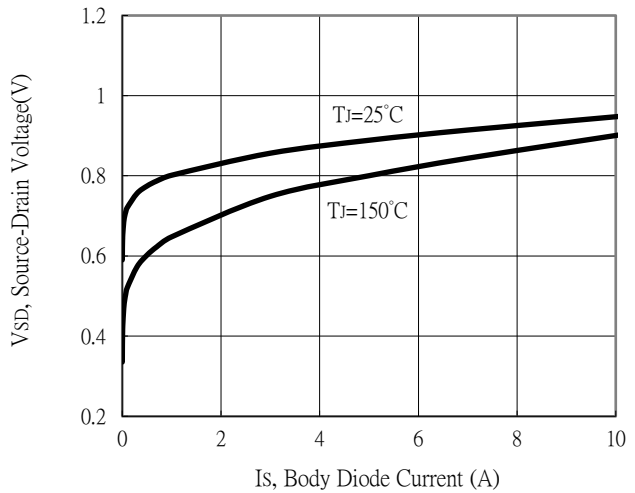
Breakdown Voltage vs Ambient Temperature



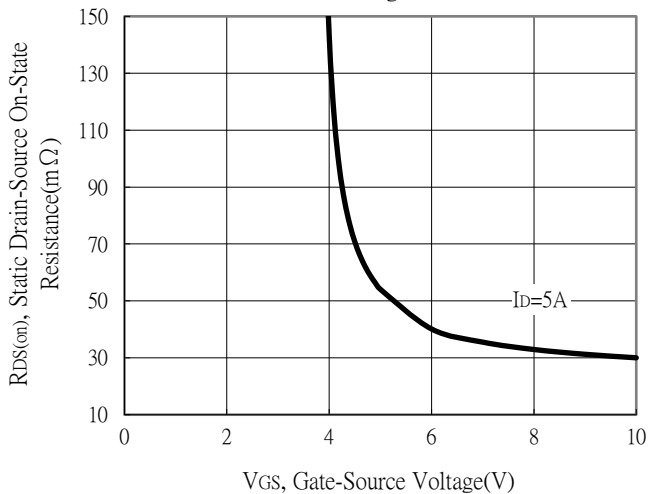
Static Drain-Source On-State resistance vs Drain Current



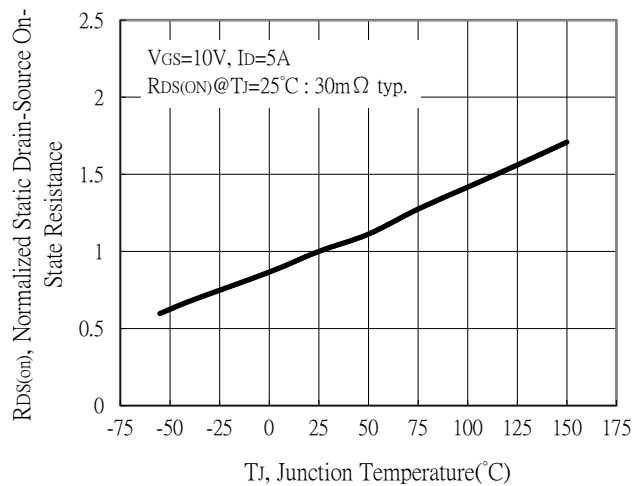
Body Diode Current vs Source-Drain Voltage



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

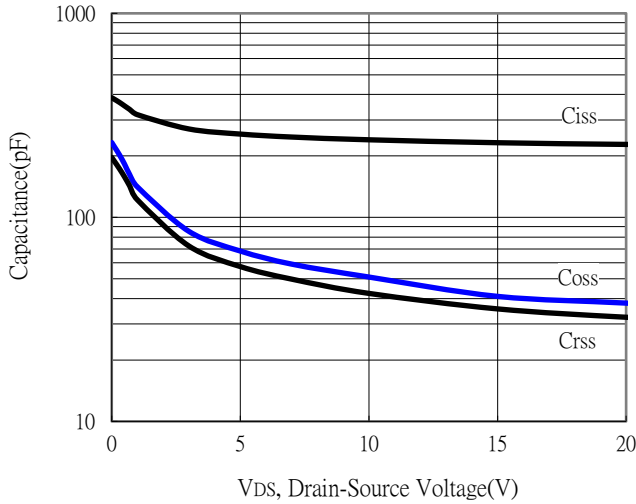


Drain-Source On-State Resistance vs Junction Temperature

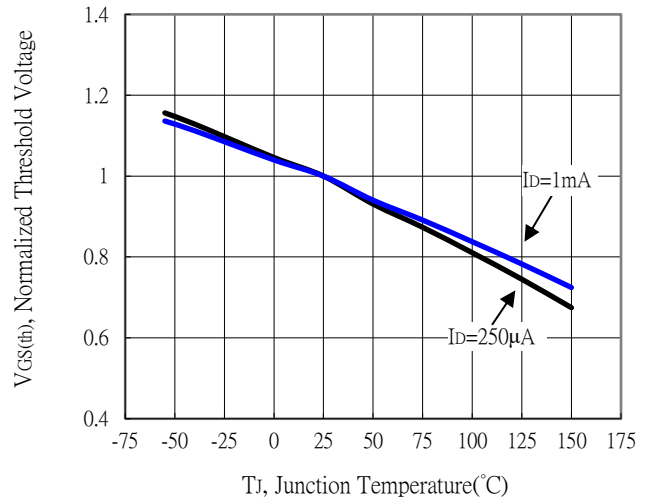


**Typical Characteristics (Cont.) : Q1(N-channel)**

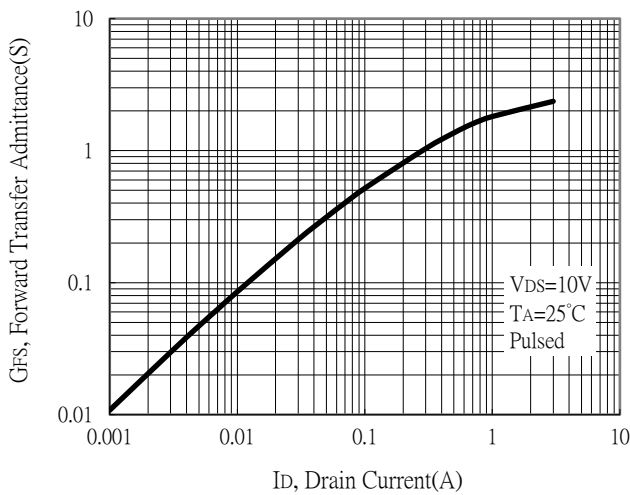
Capacitance vs Drain-to-Source Voltage



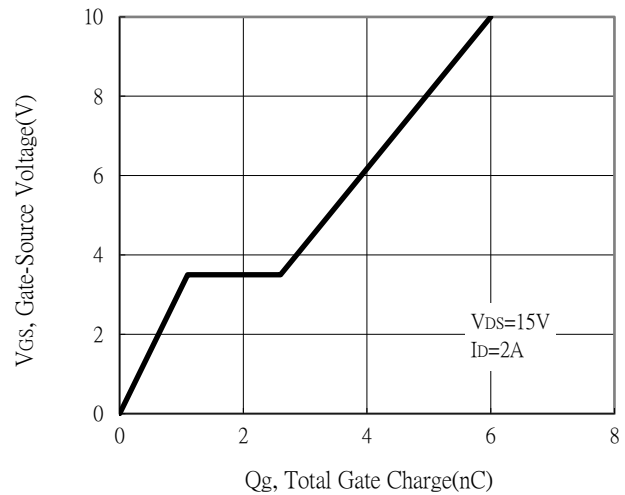
Threshold Voltage vs Junction Temperature



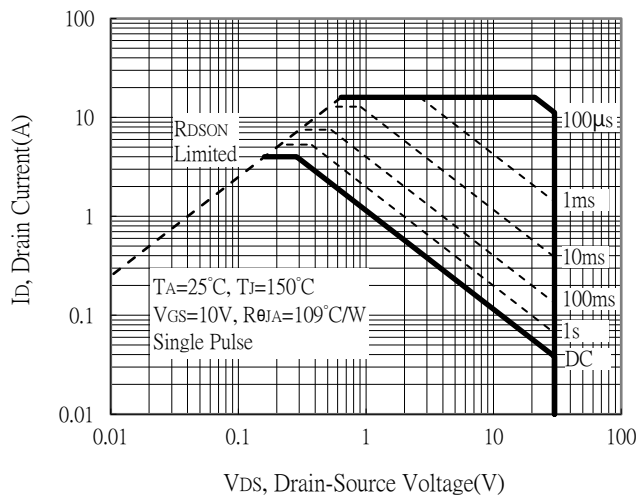
Forward Transfer Admittance vs Drain Current



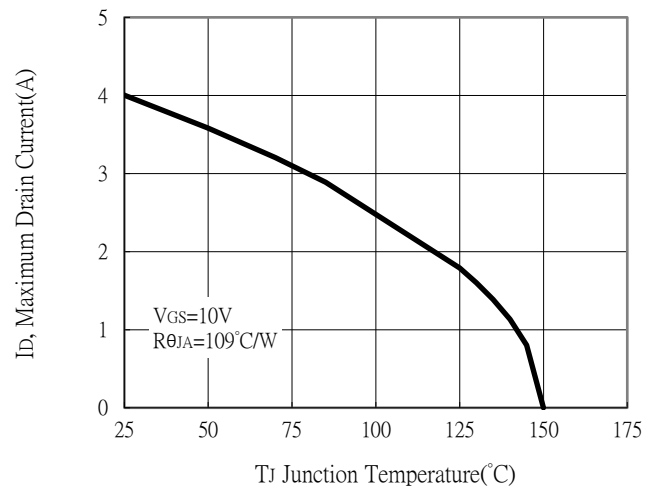
Gate Charge Characteristics



Maximum Safe Operating Area

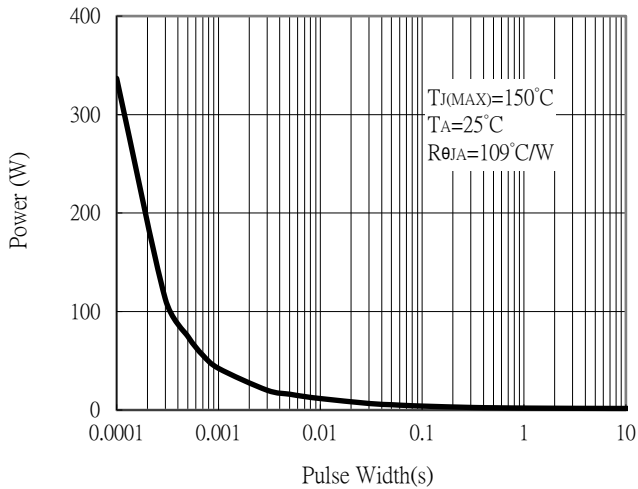


Maximum Drain Current vs Junction Temperature

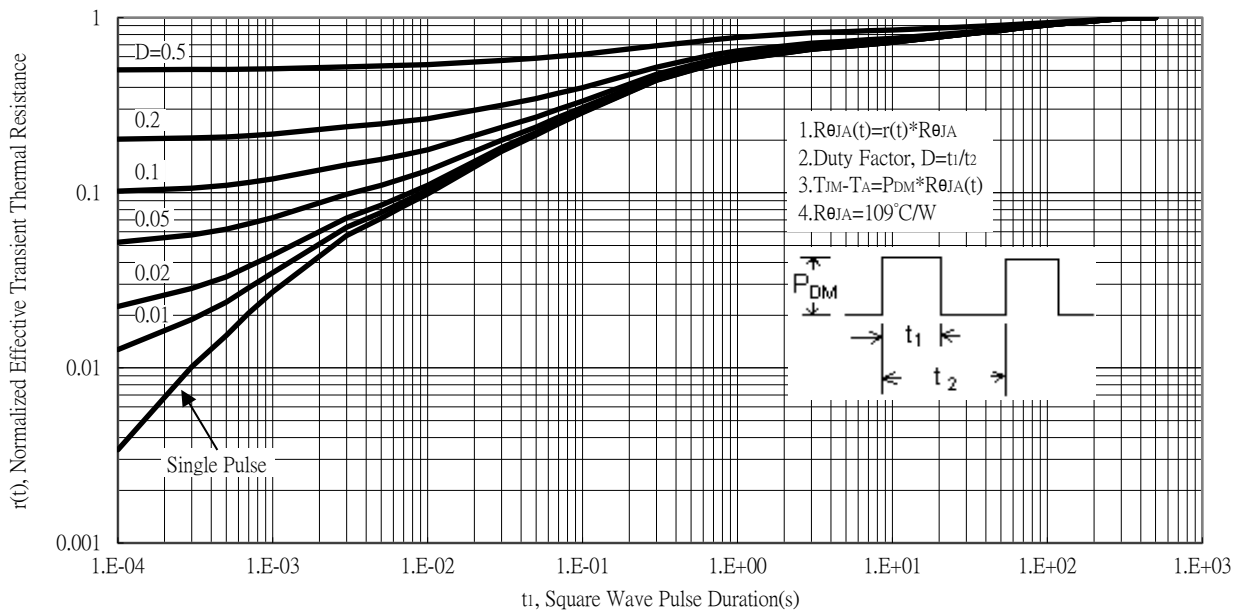


**Typical Characteristics (Cont.) : Q1(N-channel)**

Single Pulse Power Rating, Junction to Ambient



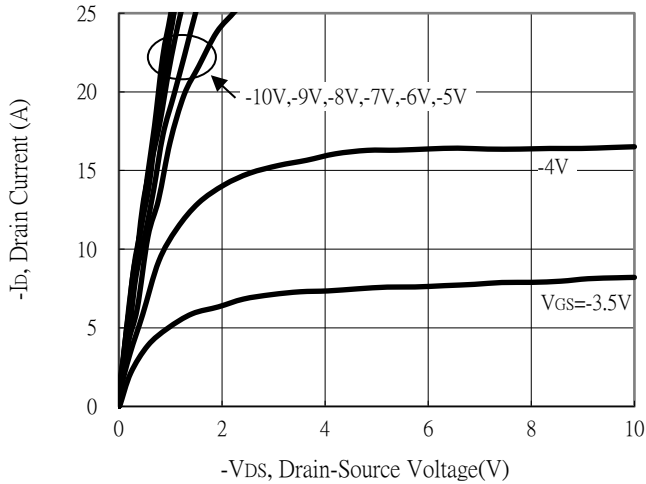
Transient Thermal Response Curves



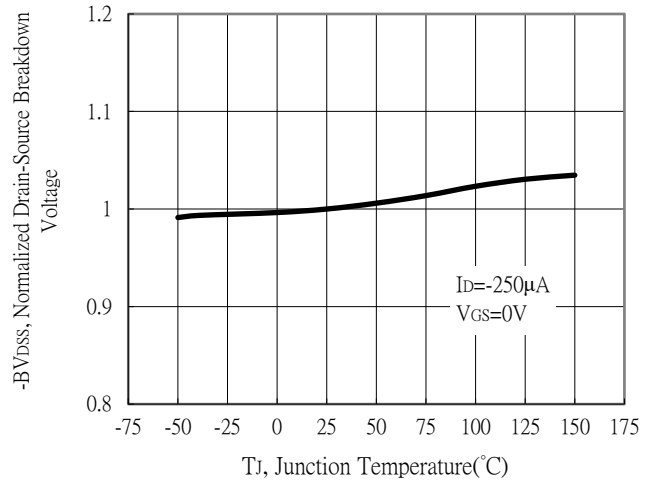


**Typical Characteristics : Q2(P-channel)**

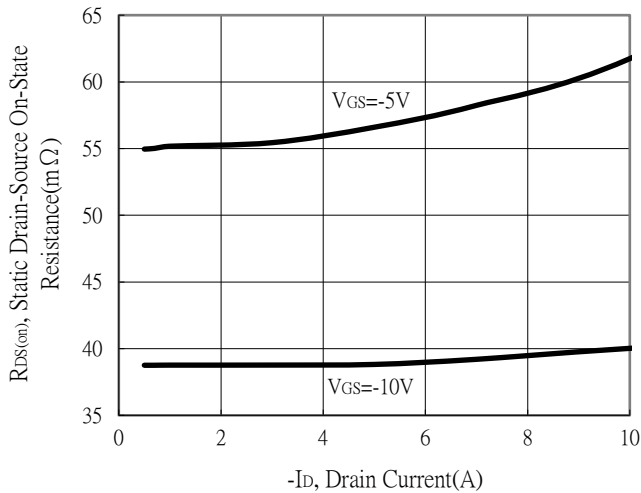
Typical Output Characteristics



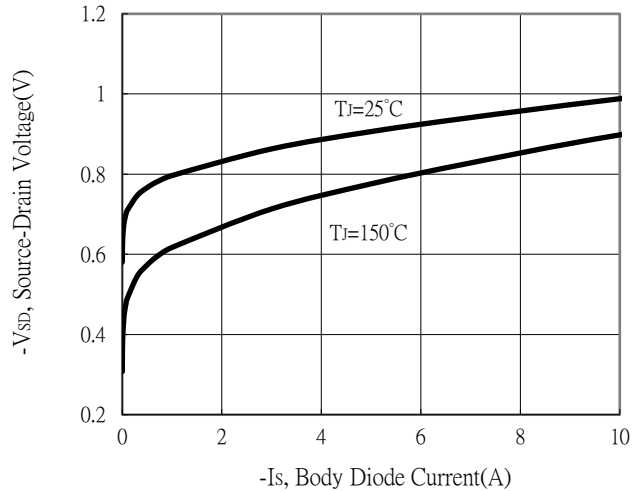
Breakdown Voltage vs Ambient Temperature



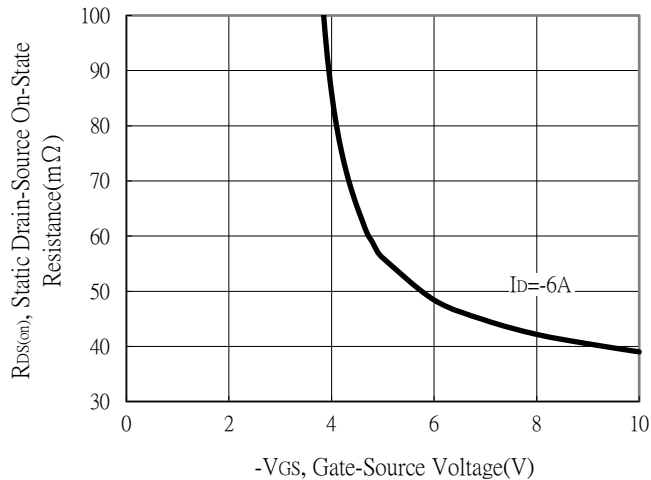
Static Drain-Source On-State resistance vs Drain Current



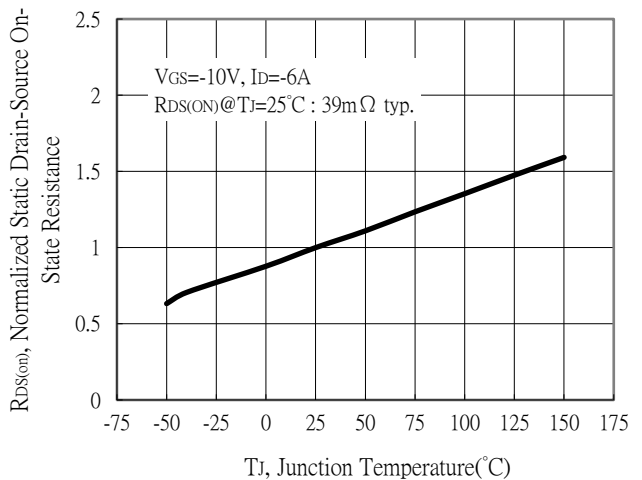
Body Diode Current vs Source-Drain Voltage



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



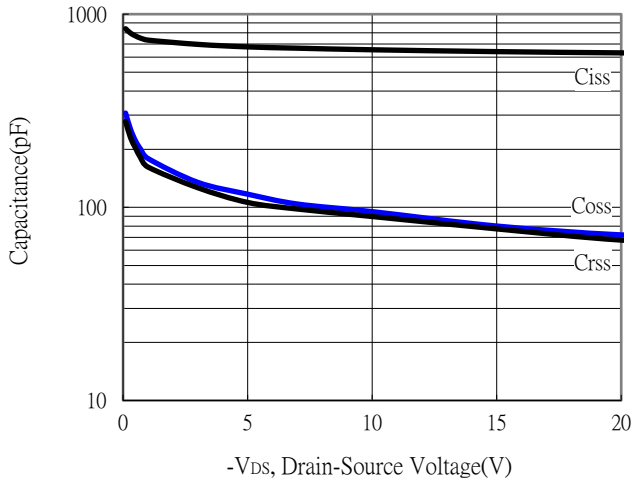
Drain-Source On-State Resistance vs Junction Temperature



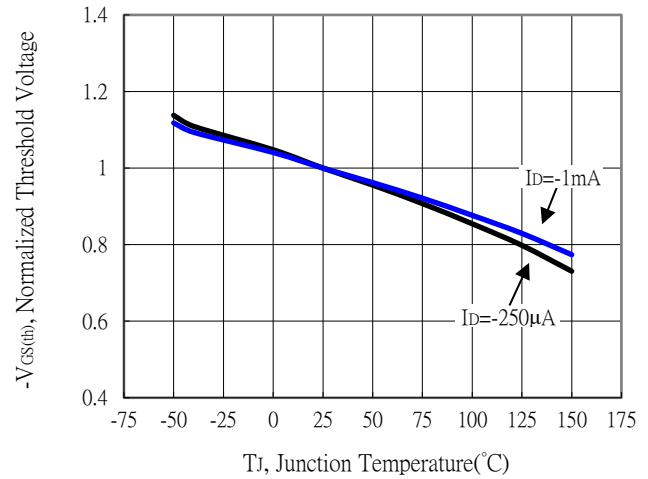


**Typical Characteristics (Cont.) : Q2(P-channel)**

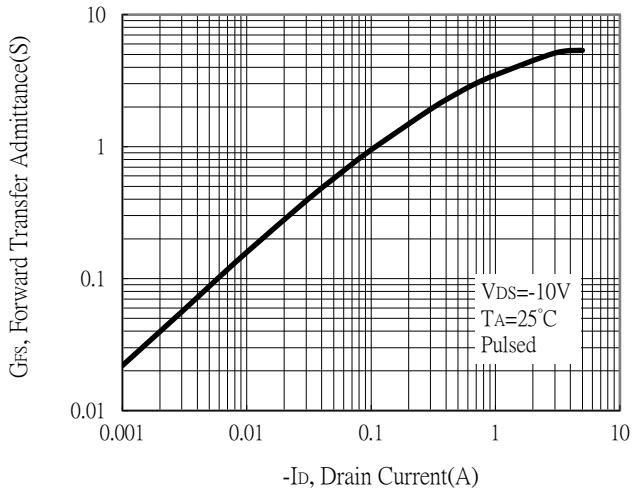
Capacitance vs Drain-to-Source Voltage



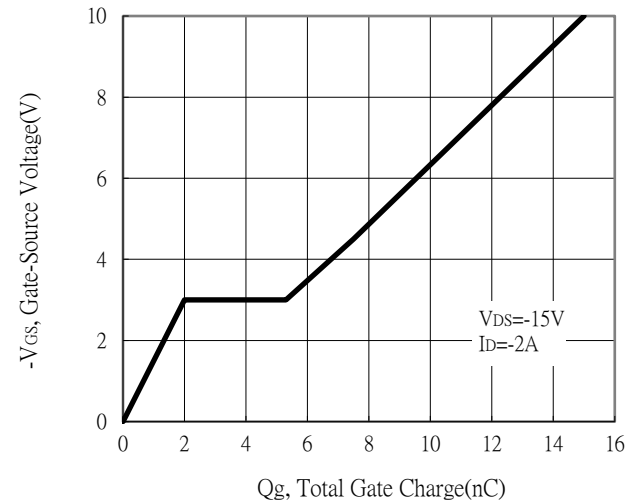
Threshold Voltage vs Junction Temperature



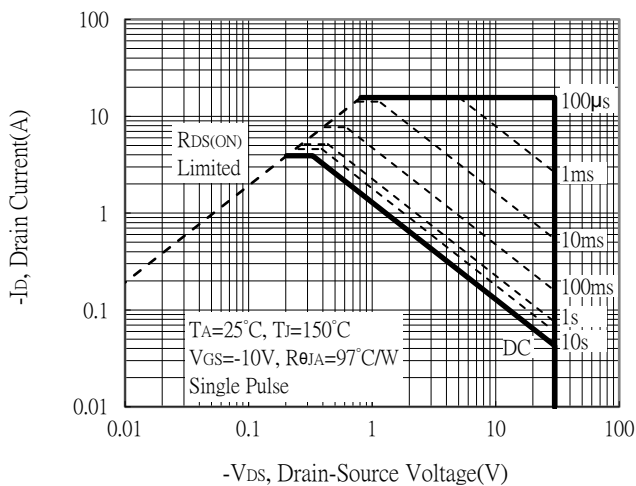
Forward Transfer Admittance vs Drain Current



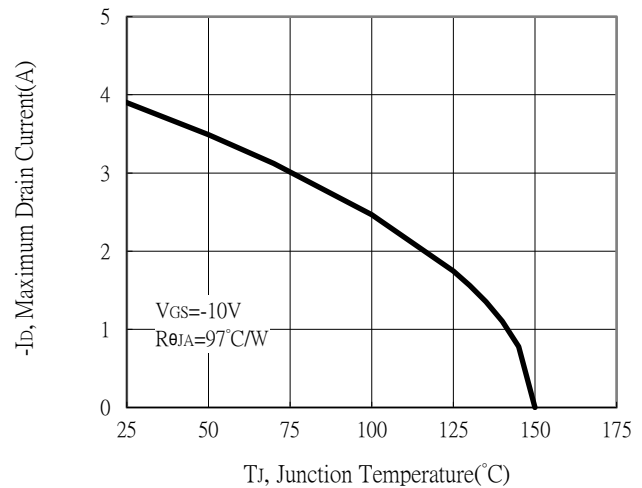
Gate Charge Characteristics



Maximum Safe Operating Area

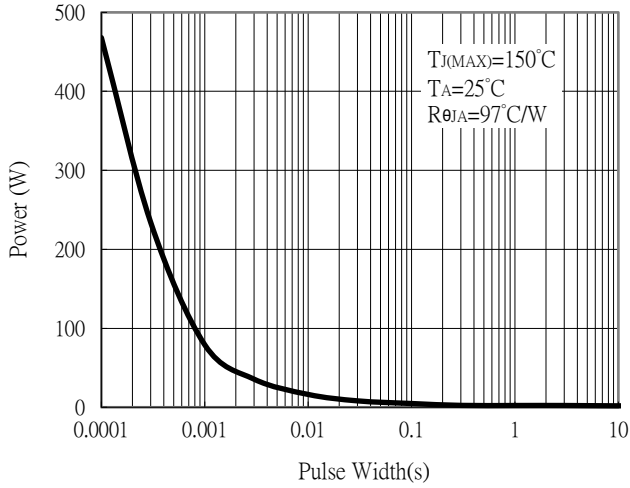


Maximum Drain Current vs Junction Temperature

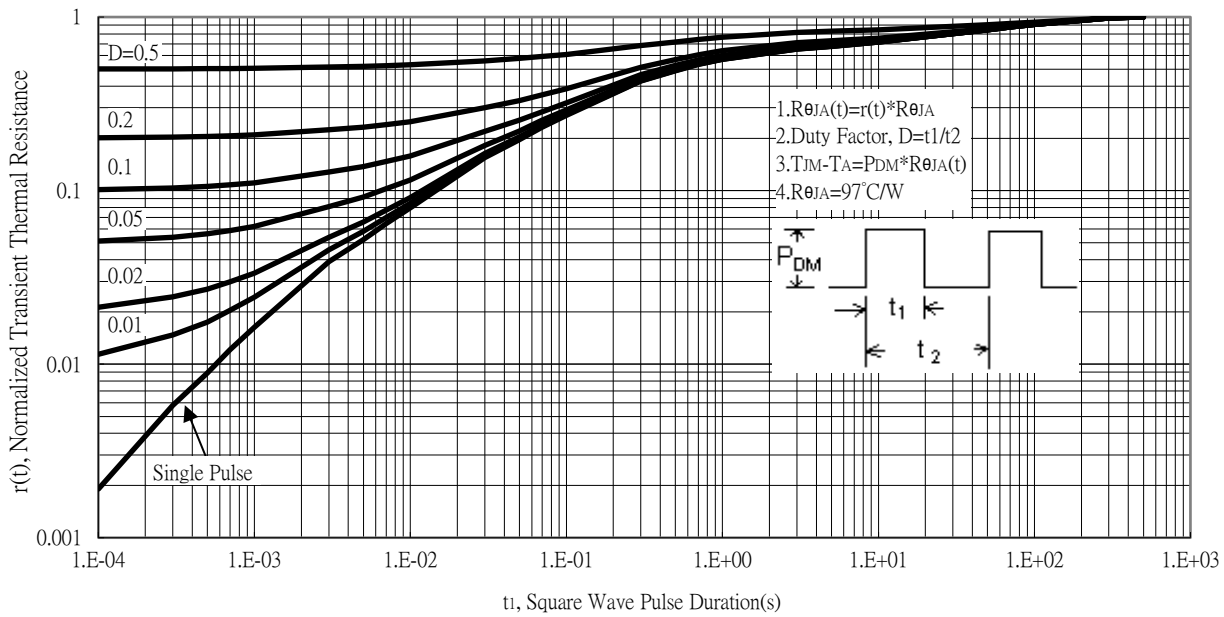


**Typical Characteristics (Cont.) : Q2(P-channel)**

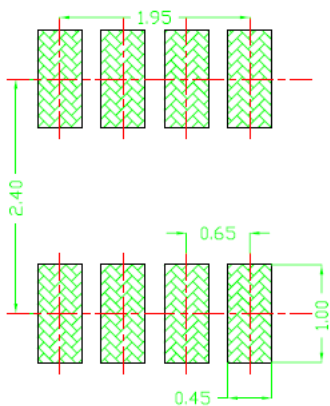
Single Pulse Power Rating, Junction to Ambient



Transient Thermal Response Curves

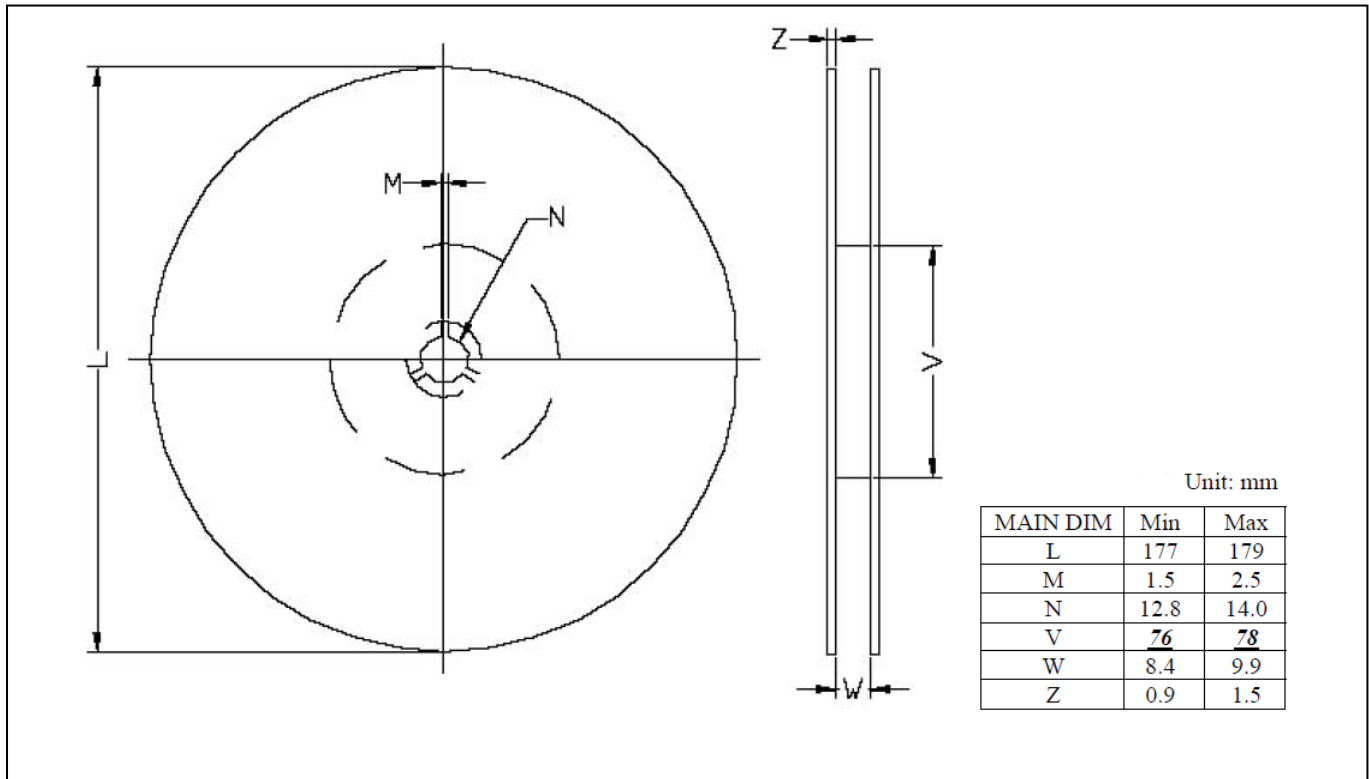


**Recommended Soldering Footprint**

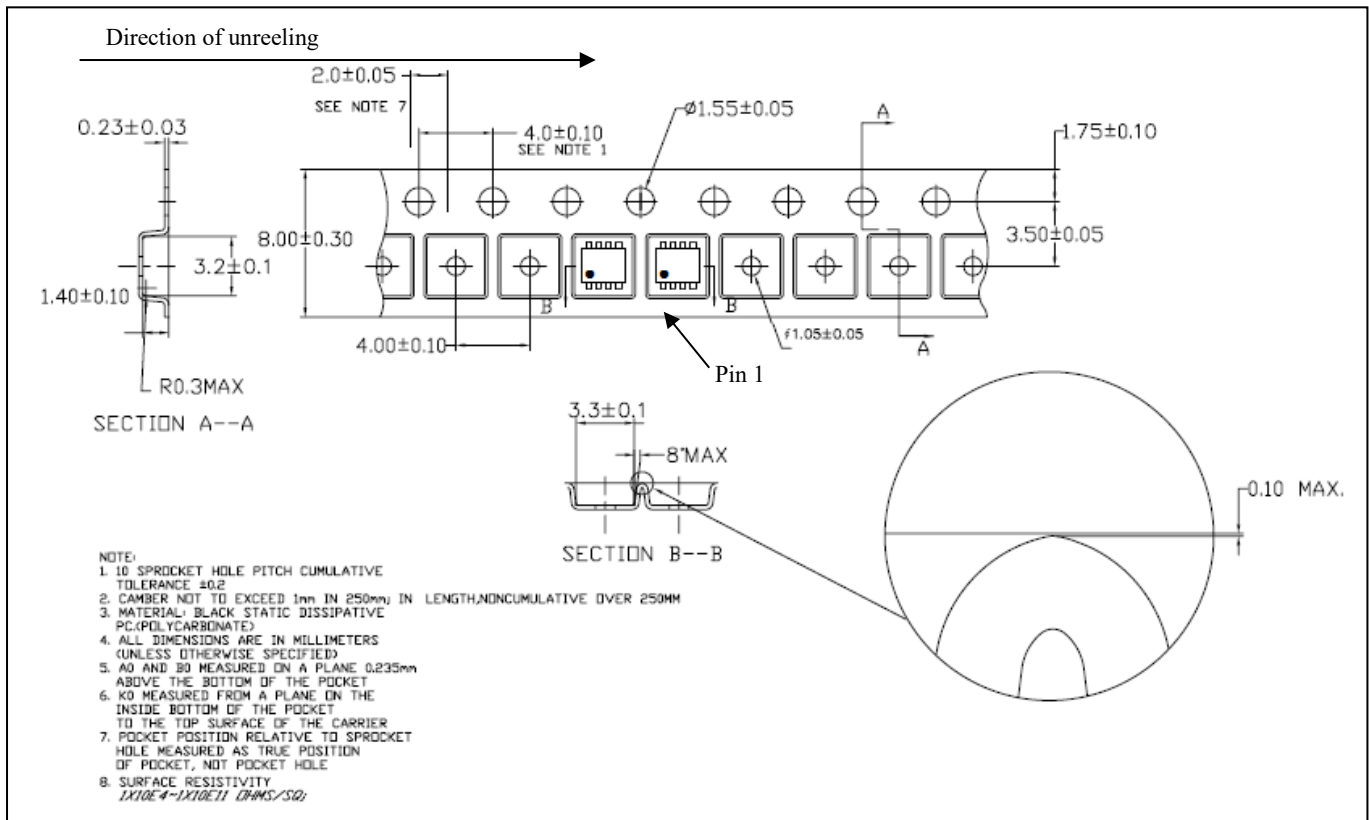


Unit : mm

## Reel Dimension



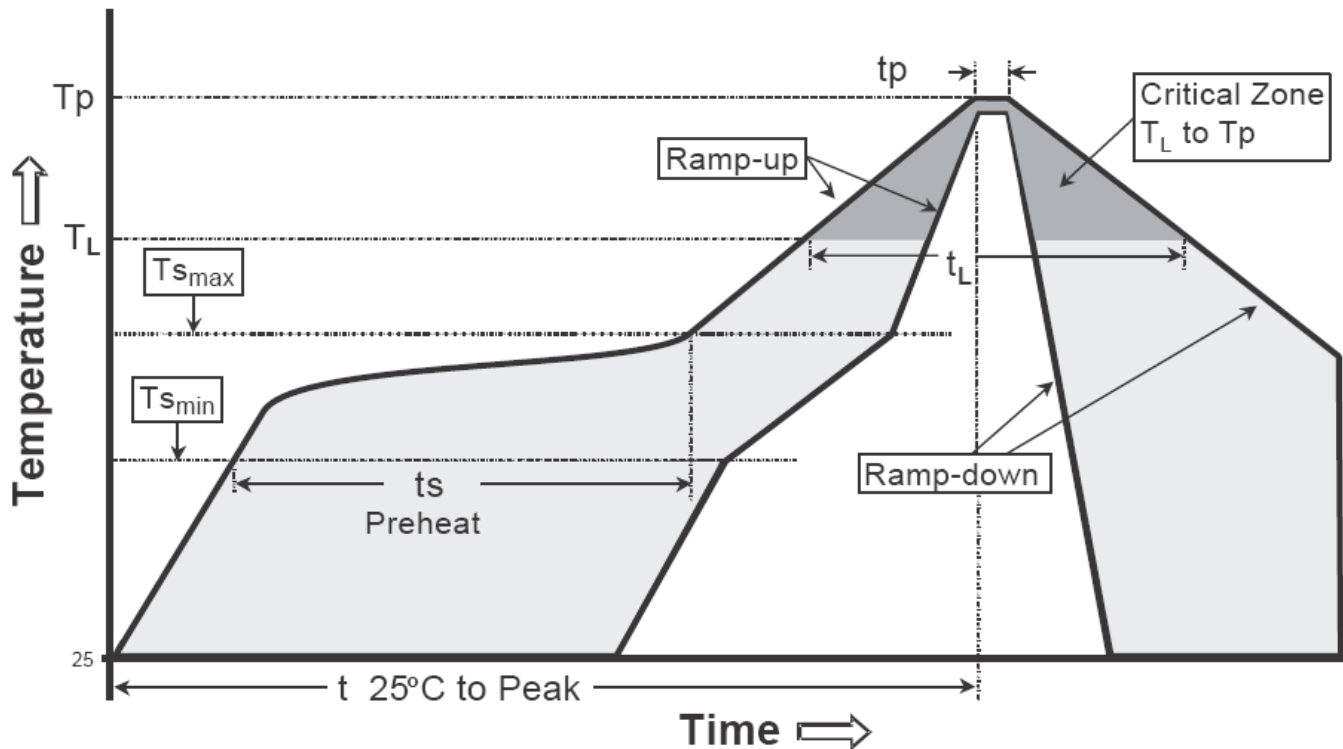
## Carrier Tape Dimension



**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 <sub>smax</sub> to T <sub>p</sub> )	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T <sub>s min</sub> )	100°C	150°C
-Temperature Max(T <sub>s max</sub> )	150°C	200°C
-Time(t <sub>s min</sub> to t <sub>s max</sub> )	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (T <sub>L</sub> )	183°C	217°C
- Time (t <sub>L</sub> )	60-150 seconds	60-150 seconds
Peak Temperature(T <sub>P</sub> )	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:**

**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  
 CYS Package Code: N8J**

**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.

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:** 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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