

**Asymmetric Dual N- Channel Enhancement Mode MOSFET**

# MTNN582803ARSH8

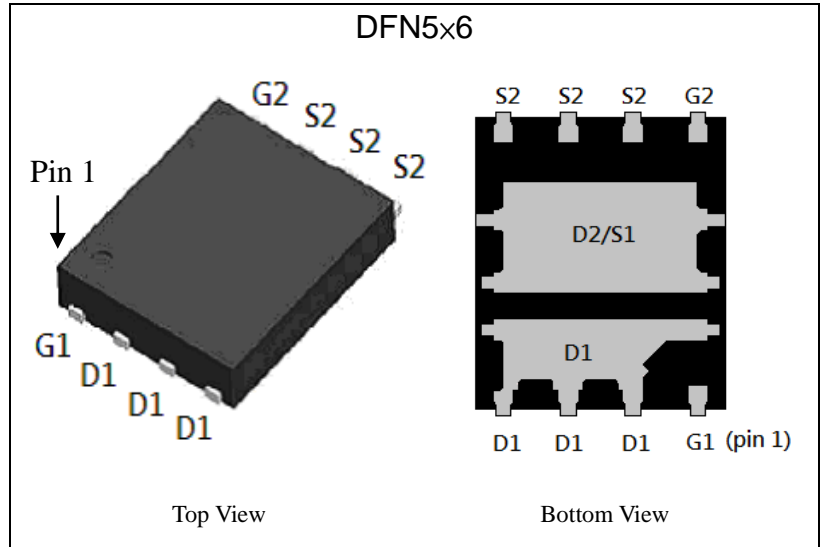
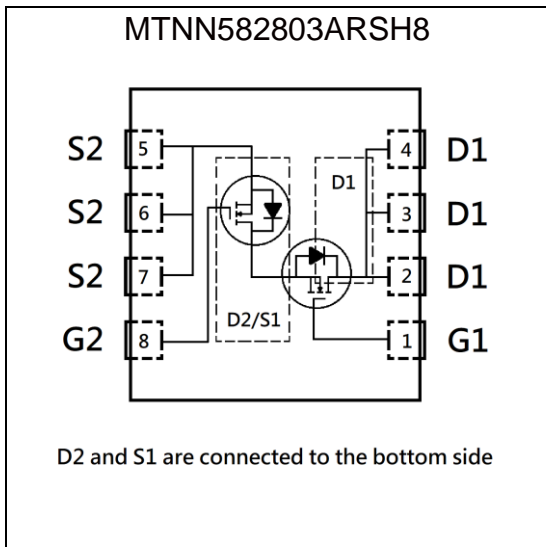
**Features**

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

	Tr 1	Tr 2
<b>BV<sub>DSS</sub></b>	<b>30V</b>	<b>30V</b>
<b>I<sub>D</sub>@ V<sub>GS</sub>=10V, T<sub>A</sub>=25°C</b>	<b>13.2A</b>	<b>15.3A</b>
<b>I<sub>D</sub>@ V<sub>GS</sub>=10V, T<sub>C</sub>=25°C</b>	<b>46A</b>	<b>63.8A</b>
<b>R<sub>DSON</sub>(typ)@ V<sub>GS</sub>=10V</b>	<b>5mΩ</b>	<b>2.7mΩ</b>
<b>R<sub>DSON</sub>(typ)@ V<sub>GS</sub>=4.5V</b>	<b>8mΩ</b>	<b>4.5mΩ</b>

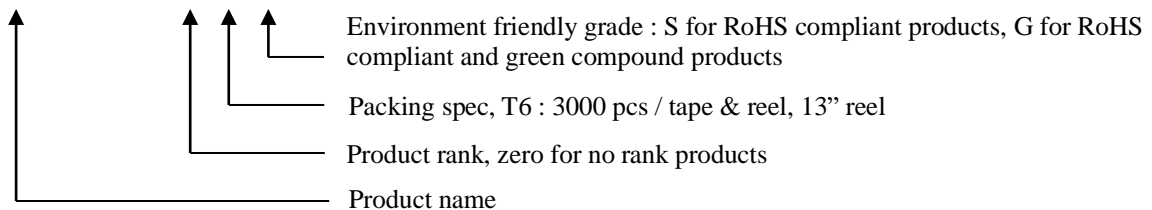
**Equivalent Circuit**

**Outline**



**Ordering Information**

Device	Package	Shipping
MTNN582803ARSH8-0-T6-G	DFN 5 x6 (Pb-free lead plating & halogen-free package)	3000 pcs / Tape & Reel



**Absolute Maximum Ratings (T<sub>C</sub>=25°C, unless otherwise noted)**

Parameter	Symbol	Limits		Unit	
		Tr 1	Tr 2		
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	30	30	V	
Gate-Source Voltage	V <sub>GS</sub>	±20	±20		
Continuous Drain Current	T <sub>A</sub> =25 °C, V <sub>GS</sub> =10V	I <sub>D</sub>	13.2	15.3	A
	T <sub>A</sub> =100 °C, V <sub>GS</sub> =10V		8.3	9.7	
	T <sub>C</sub> =25 °C, V <sub>GS</sub> =10V		46	63.8	
	T <sub>C</sub> =100 °C, V <sub>GS</sub> =10V		29	40.4	
Pulsed Drain Current (Note 1 & 2)	I <sub>DM</sub>	184	225.2		
Avalanche Current @ L=0.1mH	I <sub>AS</sub>	15	22		
Avalanche Energy @ L=0.5mH	E <sub>AS</sub>	16	42	mJ	
Power Dissipation	T <sub>A</sub> =25 °C (Note 3)	P <sub>DSM</sub>	2	42	W
	T <sub>A</sub> =70 °C (Note 3)		1.3	1.3	
	T <sub>C</sub> =25 °C	P <sub>D</sub>	34	34	
	T <sub>C</sub> =100 °C		9.6	13.6	
Operating Junction and Storage Temperature Range	T <sub>J</sub> ; T <sub>stg</sub>	-55~+150		°C	

**Thermal Data**

Parameter	Symbol	Value		Unit
Thermal Resistance, Junction-to-case, max	R <sub>θJC</sub>	5.1	3.6	°C/W
Thermal Resistance, Junction-to-ambient, max	R <sub>θJA</sub>	62.5	62.5	

- Note : 1. Pulse width limited by maximum junction temperature  
 2. Duty cycle ≤ 1%  
 3. Surface mounted on 1 in<sup>2</sup> copper pad of FR-4 board, t ≤ 10s; 125°C/W when mounted on minimum copper pad.

**Tr 1, Electrical Characteristics (Tc=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
ΔBV <sub>DSS</sub> /ΔT <sub>j</sub>	-	0.04	-	mV/°C	Reference to 25°C, I <sub>D</sub> =250μA
V <sub>GS(th)</sub>	1.0	-	2.5	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA
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
	-	-	25		V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C
*R <sub>DS(ON)</sub>	-	5	6.5	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =20A
	-	8	11.5		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A
*G <sub>FS</sub>	-	16.1	-	S	V <sub>DS</sub> =5V, I <sub>D</sub> =20A
<b>Dynamic</b>					
C <sub>iss</sub>	-	764	-	pF	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz
C <sub>oss</sub>	-	526	-		
C <sub>rss</sub>	-	67	-		
*td(ON)	-	8.4	-	ns	V <sub>DS</sub> =15V, I <sub>D</sub> =20A, V <sub>GS</sub> =10V, R <sub>G</sub> =1Ω
*tr	-	12.4	-		
*td(OFF)	-	24.2	-		
*tf	-	5.8	-		
*Q <sub>g</sub> (V <sub>GS</sub> =10V)	-	14.4	-	nC	V <sub>DS</sub> =15V, I <sub>D</sub> =20A, V <sub>GS</sub> =10V
*Q <sub>g</sub> (V <sub>GS</sub> =4.5V)	-	7.2	-		
*Q <sub>gs</sub>	-	2.7	-		
*Q <sub>gd</sub>	-	2.9	-		
R <sub>g</sub>	-	0.72	-	Ω	f=1MHz
<b>Body Diode</b>					
*I <sub>S</sub>	-	-	20	A	
*I <sub>SM</sub>	-	-	80		
*V <sub>SD</sub>	-	0.83	1.2	V	V <sub>GS</sub> =0V, I <sub>S</sub> =10A
*trr	-	17.1	-	ns	I <sub>F</sub> =20A, dI <sub>F</sub> /dt=100A/μs
*Q <sub>rr</sub>	-	5.8	-	nC	

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

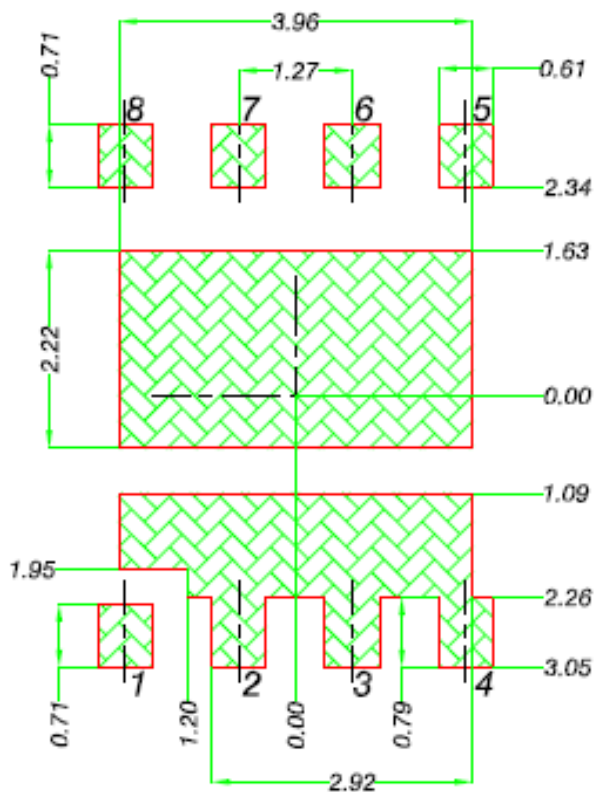
**Tr 2, Electrical Characteristics (Tc=25°C, unless otherwise specified)**

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
ΔBV <sub>DSS</sub> /ΔT <sub>j</sub>	-	0.04	-	mV/°C	Reference to 25°C, I <sub>D</sub> =-250μA
V <sub>GS(th)</sub>	1.0	-	2.5	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA
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
	-	-	25		V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C
*R <sub>DS(ON)</sub>	-	2.7	3.5	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =20A
	-	4.5	6.3		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A
*G <sub>FS</sub>	-	25.6	-	S	V <sub>DS</sub> =5V, I <sub>D</sub> =20A

<b>Dynamic</b>					
$C_{iss}$	-	1603	-	pF	$V_{DS}=15V, V_{GS}=0V, f=1MHz$
$C_{oss}$	-	1087	-		
$C_{rss}$	-	119	-		
* $t_{d(ON)}$	-	14.2	-	ns	$V_{DS}=15V, I_D=20A, V_{GS}=10V, R_G=1\Omega$
* $t_r$	-	14.2	-		
* $t_{d(OFF)}$	-	38.5	-		
* $t_f$	-	8.2	-		
* $Q_g(V_{GS}=10V)$	-	28.3	-	nC	$V_{DS}=15V, I_D=20A, V_{GS}=10V$
* $Q_g(V_{GS}=4.5V)$	-	14.3	-		
* $Q_{gs}$	-	5.4	-		
* $Q_{gd}$	-	5.7	-		
$R_g$	-	0.96	-	$\Omega$	$f=1MHz$
<b>Body Diode</b>					
* $I_S$	-	-	28	A	
* $I_{SM}$	-	-	112		
* $V_{SD}$	-	0.82	1.2	V	$V_{GS}=0V, I_S=14A$
* $t_{rr}$	-	30	-	ns	$I_F=20A, dI_F/dt=100A/\mu s$
* $Q_{rr}$	-	16	-	nC	

\*Pulse Test : Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$

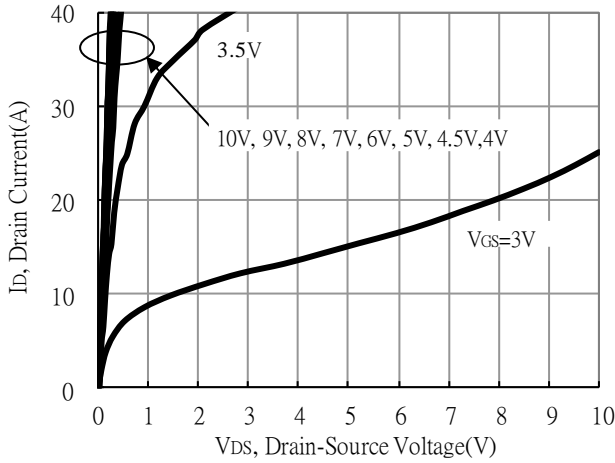
**Recommended Soldering Footprint**



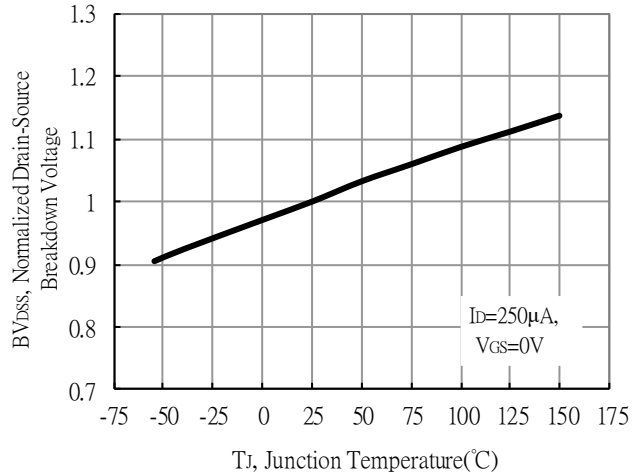
unit : mm

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

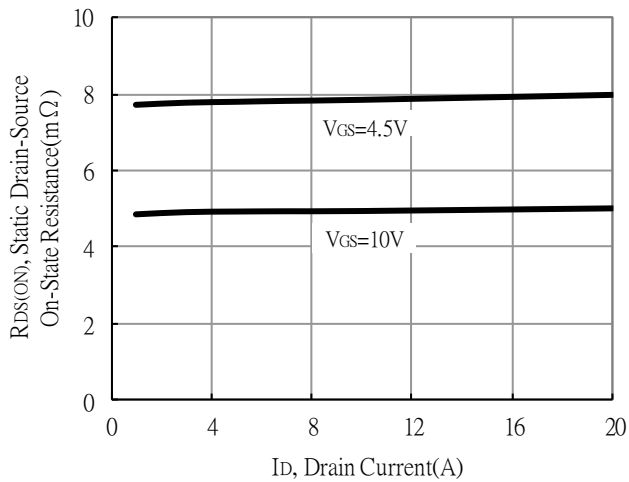
Typical Output Characteristics



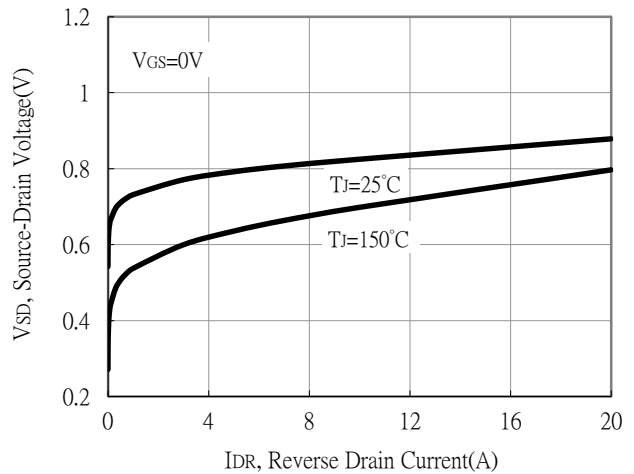
Brekdown Voltage vs Ambient Temperature



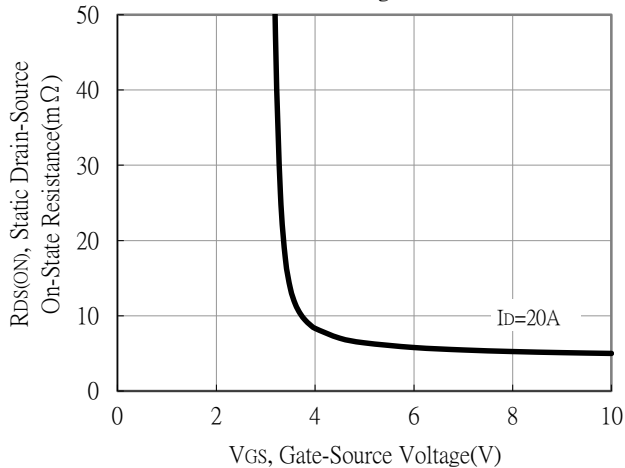
Static Drain-Source On-State resistance vs Drain Current



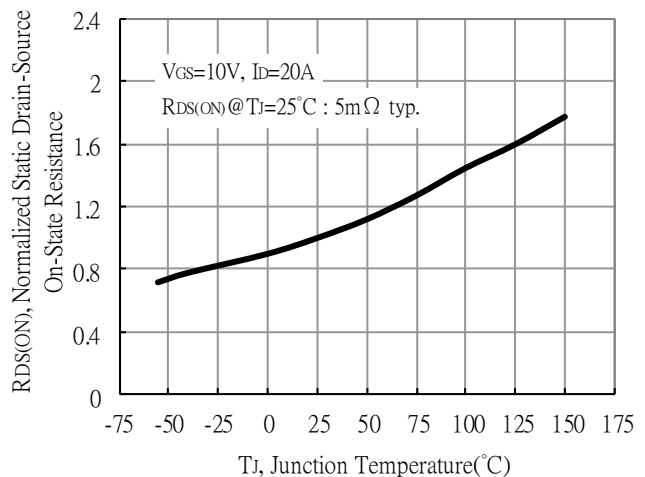
Reverse Drain Current vs Source-Drain Voltage



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

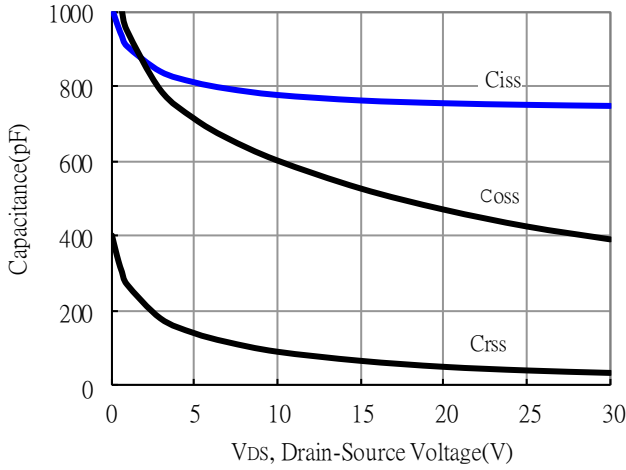


Drain-Source On-State Resistance vs Junction Temperature

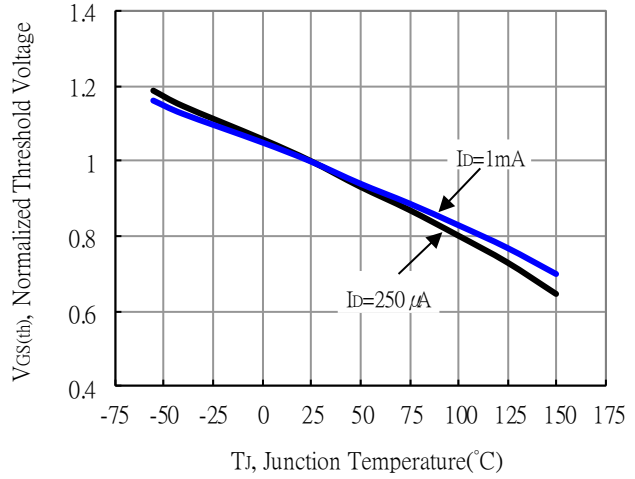


**Typical Characteristics(Cont.) : Q1( N-channel)**

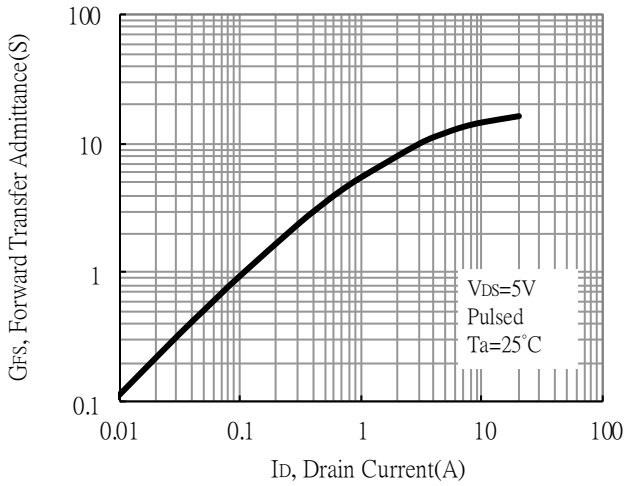
Capacitance vs Drain-to-Source Voltage



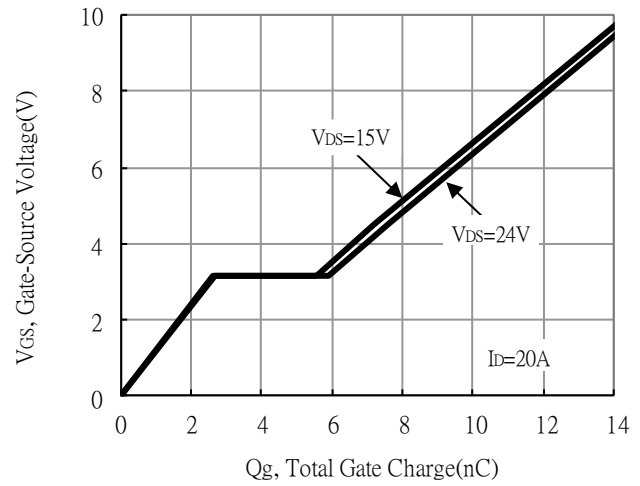
Threshold Voltage vs Junction Temperature



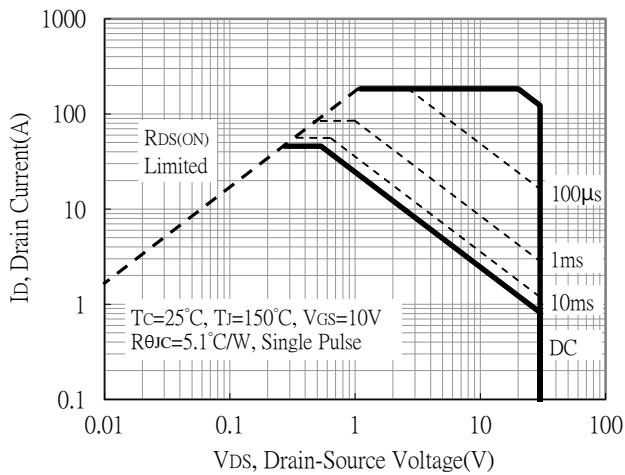
Forward Transfer Admittance vs Drain Current



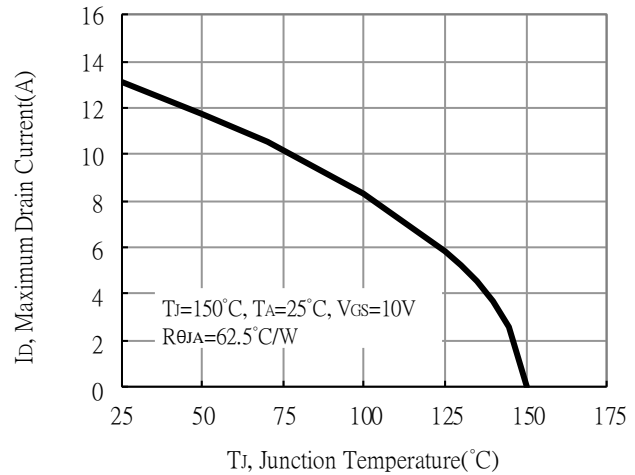
Gate Charge Characteristics



Maximum Safe Operating Area

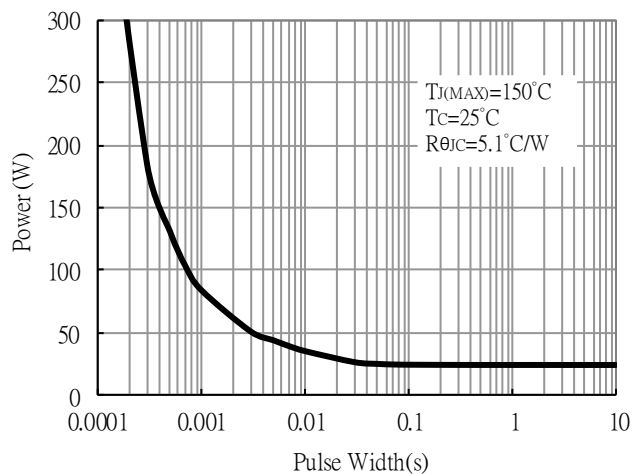


Maximum Drain Current vs Junction Temperature

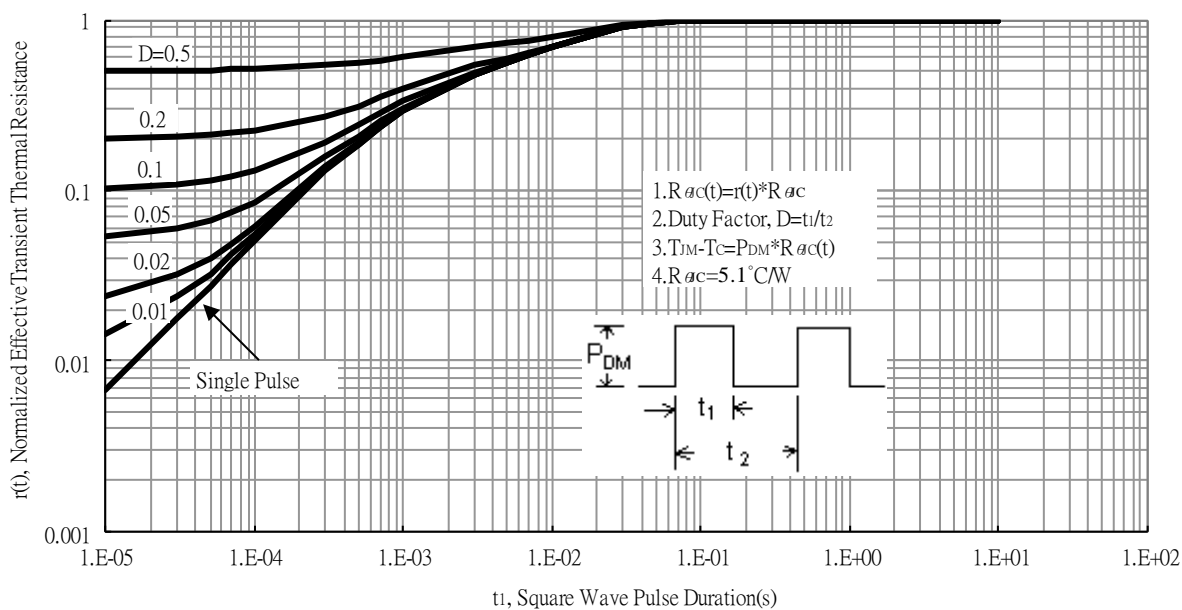


**Typical Characteristics(Cont.) : Q1( N-channel)**

Single Pulse Power Rating, Junction to Case

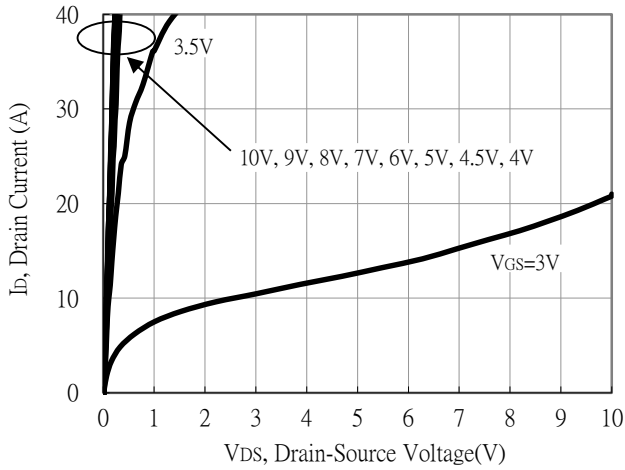


Transient Thermal Response Curves

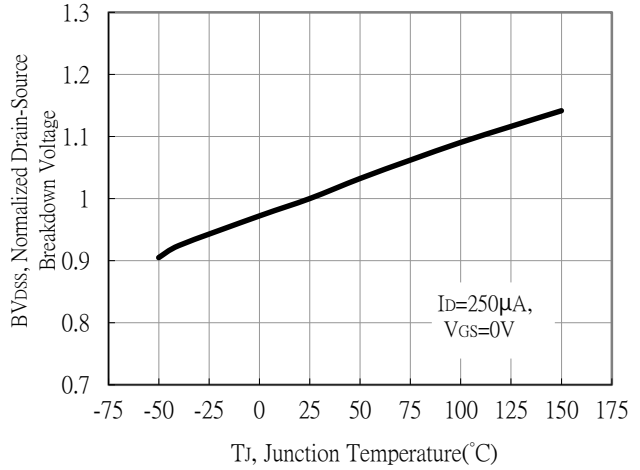


**Typical Characteristics : Q2( N-channel)**

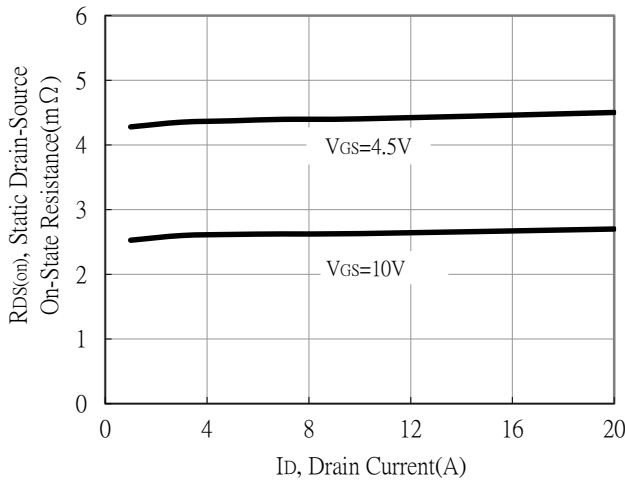
Typical Output Characteristics



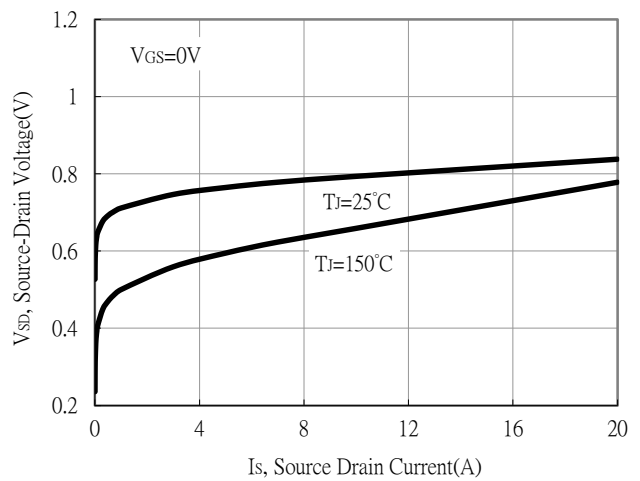
Brekdown Voltage vs Ambient Temperature



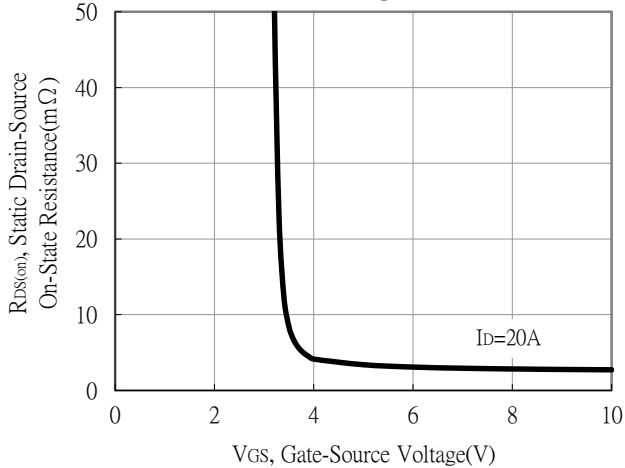
Static Drain-Source On-State resistance vs Drain Current



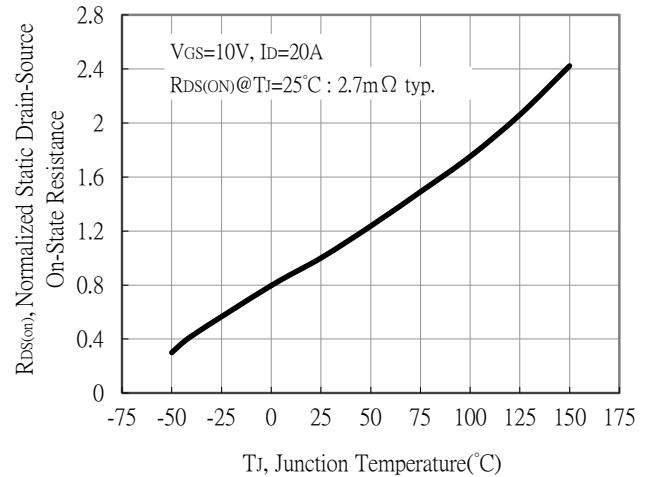
Source Drain Current vs Source-Drain Voltage



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



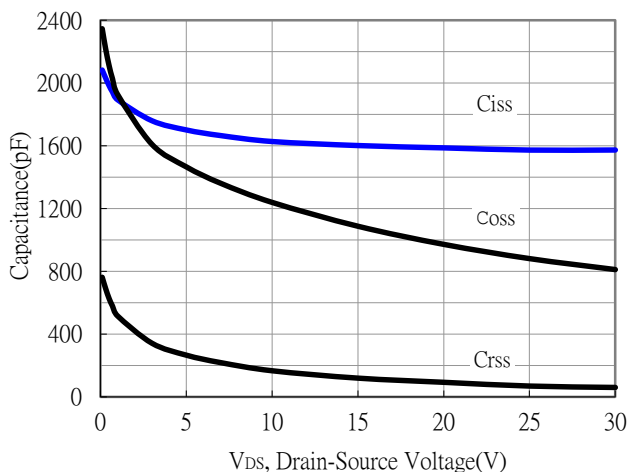
Drain-Source On-State Resistance vs Junction Temperature



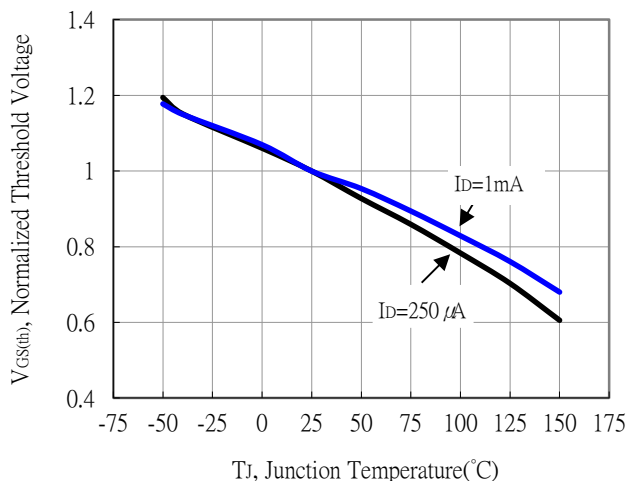


**Typical Characteristics(Cont.) : Q2(N-channel)**

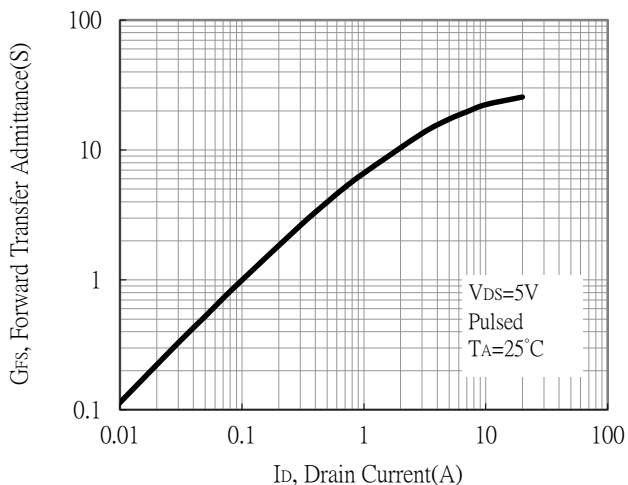
Capacitance vs Drain-to-Source Voltage



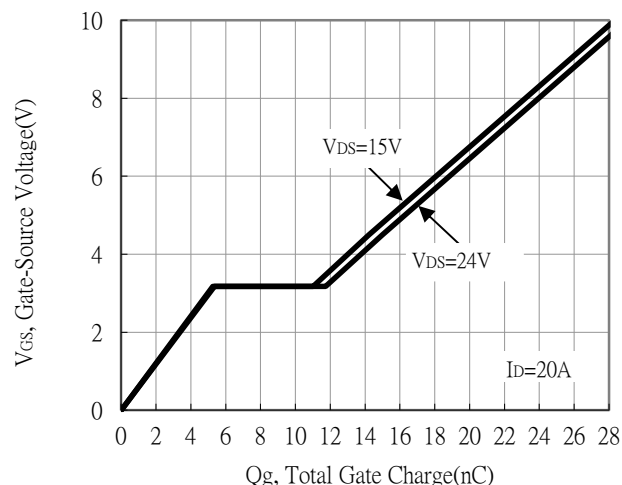
Threshold Voltage vs Junction Temperature



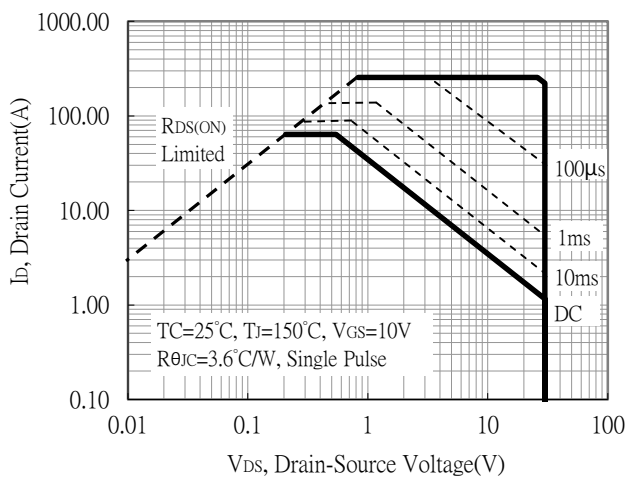
Forward Transfer Admittance vs Drain Current



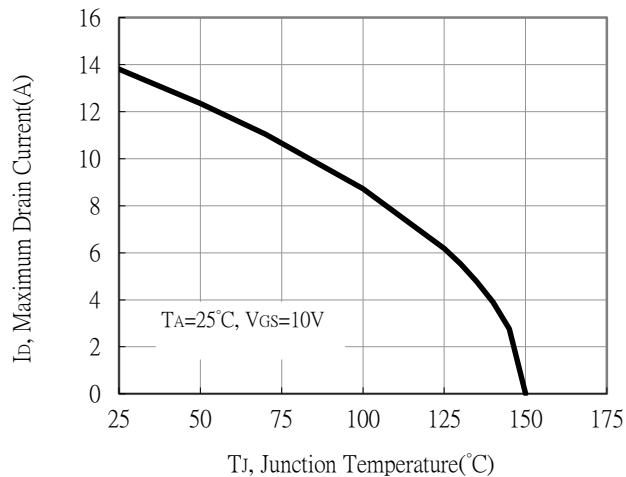
Gate Charge Characteristics



Maximum Safe Operating Area

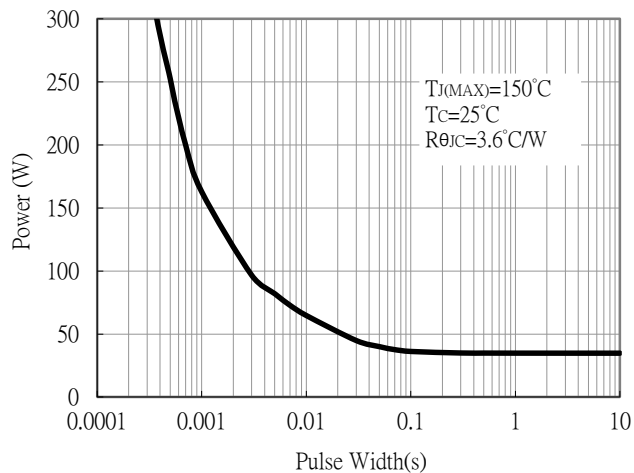


Maximum Drain Current vs Junction Temperature

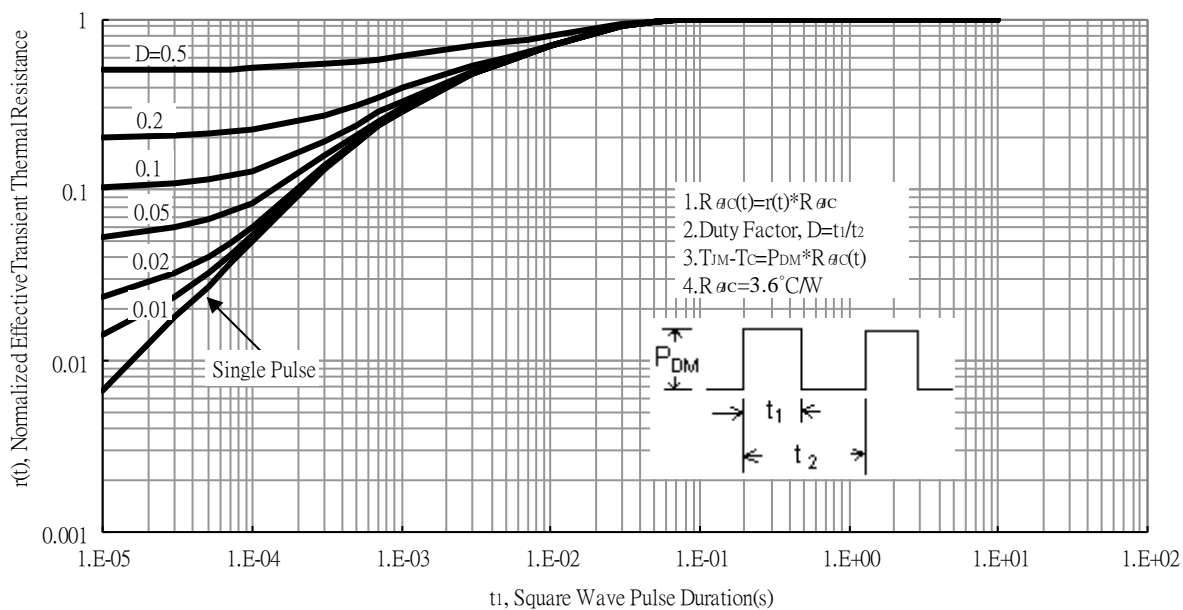


**Typical Characteristics(Cont.) : Q2(N-channel)**

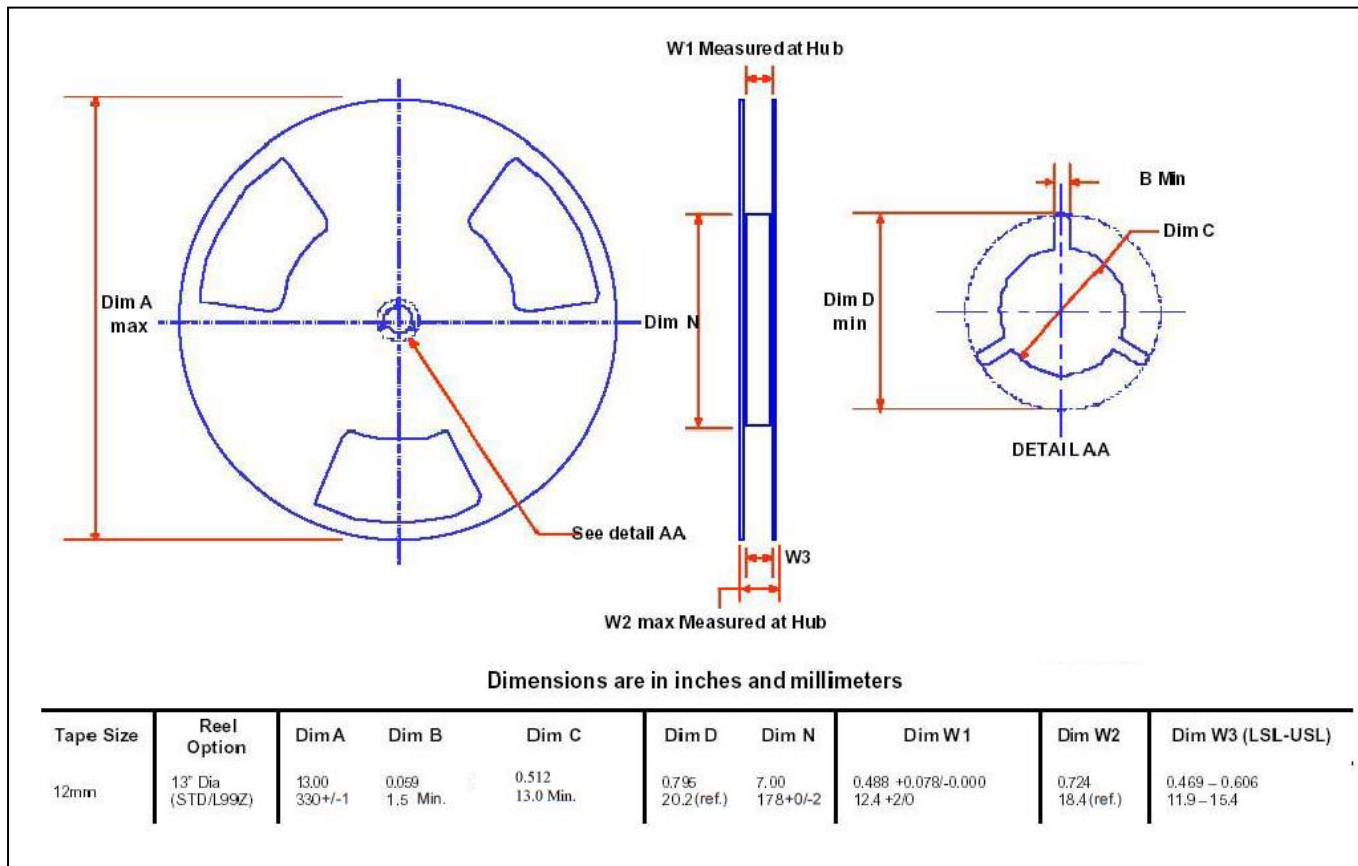
Single Pulse Power Rating, Junction to Case



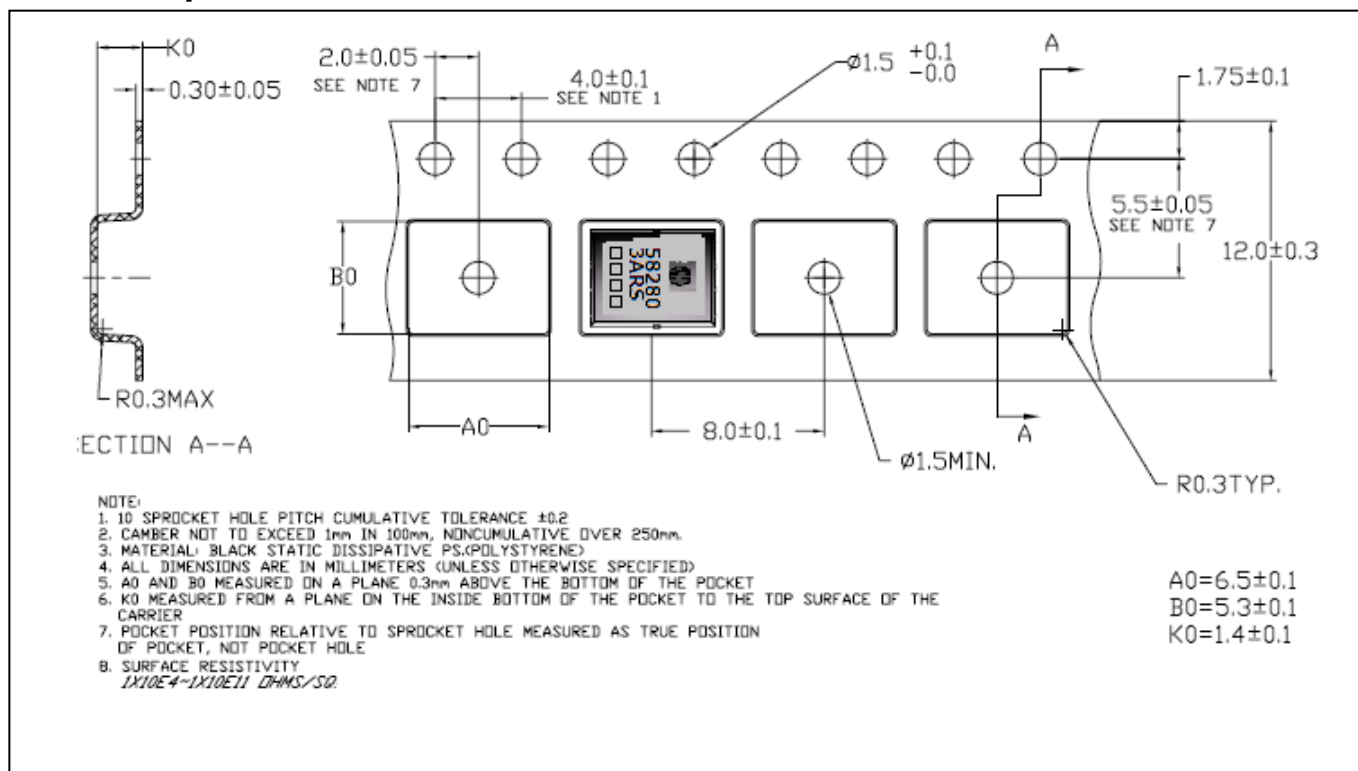
Transient Thermal Response Curves



### Reel Dimension

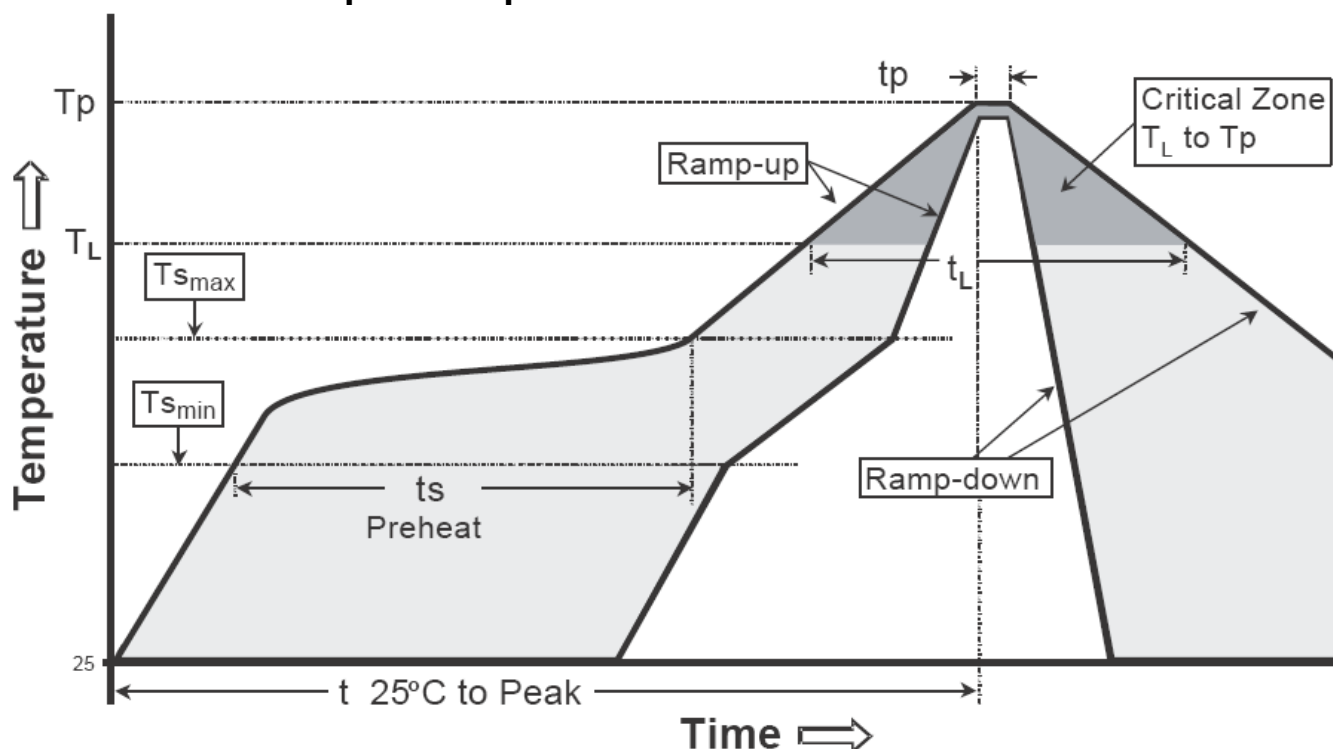


### Carrier Tape Dimension



**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(ts min to ts max)	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.

**DFN5x6 Dimension**

**Marking:**

Device Name → 58280  
 Date Code → 3ARS  
 Date Code field: □□□□(G)  
 Assembly Site code: Blank → JCET, G → GEM

**8-Lead DFN5x6 Plastic Package**  
**CYS Package Code : H8**

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

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, 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.

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.90	1.10	0.035	0.043	F	2.55	2.90	0.100	0.114
b	0.33	0.51	0.013	0.020	H	0.61	0.81	0.024	0.032
C	0.20	0.30	0.008	0.012	I	1.10	1.30	0.043	0.051
D1	4.80	5.00	0.189	0.197	J	0.40	0.60	0.016	0.024
D2	3.61	3.96	0.142	0.156	K	0.50	-	0.020	-
E	5.90	6.10	0.232	0.240	L	0.51	0.71	0.020	0.028
E1	5.70	5.80	0.224	0.228	L1	0.06	0.20	0.002	0.008
E2	2.02	2.42	0.080	0.095	α	0°	12°	0°	12°
[e]	1.27 BSC		0.050 BSC						

**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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