

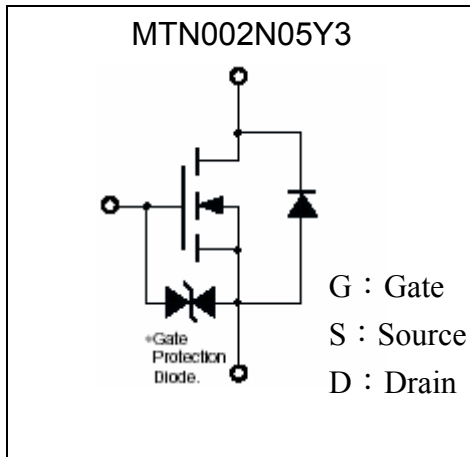
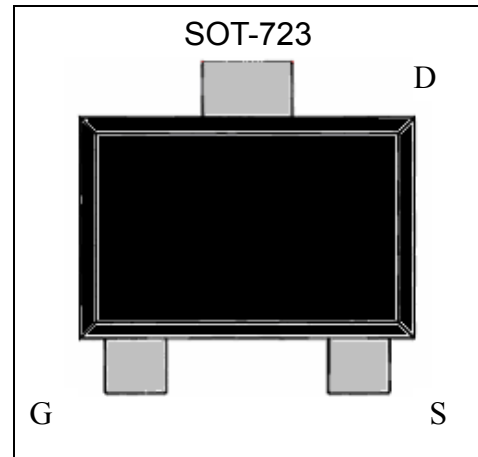
**50V N-CHANNEL Enhancement Mode MOSFET**

# MTN002N05Y3

BV <sub>DSS</sub>	50V
I <sub>D</sub>	250mA
R <sub>DS(on)</sub> @V <sub>GS</sub> =4.5V, I <sub>D</sub> =220mA	1.2 Ω (typ)
R <sub>DS(on)</sub> @V <sub>GS</sub> =2.5V, I <sub>D</sub> =220mA	1.7 Ω (typ)
R <sub>DS(on)</sub> @V <sub>GS</sub> =1.8V, I <sub>D</sub> =100mA	3.6 Ω (typ)

**Features**

- Simple drive requirement
- Small package outline
- Pb-free package

**Symbol**

**Outline**

**Absolute Maximum Ratings (T<sub>a</sub>=25°C)**

Parameter	Symbol	Limits	Unit	
Drain-Source Voltage	V <sub>DS</sub>	50	V	
Gate-Source Voltage	V <sub>GS</sub>	±20		
Continuous Drain Current @ T <sub>A</sub> =25°C, V <sub>GS</sub> =4.5V (Note 3)	I <sub>D</sub>	250	mA	
Continuous Drain Current @ T <sub>A</sub> =85°C, V <sub>GS</sub> =4.5V (Note 3)		180		
Pulsed Drain Current (Notes 1, 2)	I <sub>DM</sub>	1	A	
Maximum Power Dissipation (Note 3)	P <sub>D</sub>	T <sub>A</sub> =25°C	150	mW
		T <sub>A</sub> =85°C	80	
ESD susceptibility		1500 (Note 4)	V	
Operating Junction and Storage Temperature	T <sub>j</sub> , T <sub>stg</sub>	-55~+150	°C	

- Note : 1. Pulse width limited by maximum junction temperature.  
 2. Pulse width ≤ 300μs, duty cycle ≤ 2%.  
 3. Surface mounted on FR-4 board.  
 4. Human body model, 1.5kΩ in series with 100pF.



**Thermal Performance**

Parameter	Symbol	Limit	Unit
Thermal Resistance, Junction-to-Ambient(PCB mounted)	Rth,ja	833	°C/W

**Electrical Characteristics (Tj=25°C, unless otherwise noted)**

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
BV <sub>DSS</sub>	50	-	-	V	V <sub>GS</sub> =0, I <sub>D</sub> =250μA
V <sub>GS(th)</sub>	0.5	1.1	1.5	V	V <sub>DS</sub> =10V, I <sub>D</sub> =1mA
I <sub>GSS</sub>	-	-	±10	μA	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0
I <sub>DSS</sub>	-	-	1		V <sub>DS</sub> =50V, V <sub>GS</sub> =0
	-	-	10		V <sub>DS</sub> =40V, V <sub>GS</sub> =0 (Tj=70°C)
*R <sub>DS(ON)</sub>	-	1.2	1.6	Ω	V <sub>GS</sub> =4.5V, I <sub>D</sub> =220mA
	-	1.7	2.2		V <sub>GS</sub> =2.5V, I <sub>D</sub> =220mA
	-	3.6	5		V <sub>GS</sub> =1.8V, I <sub>D</sub> =100mA
*G <sub>FS</sub>	0.4	0.6	-	S	V <sub>DS</sub> =10V, I <sub>D</sub> =220mA
<b>Dynamic</b>					
C <sub>iss</sub>	-	43	-	pF	V <sub>DS</sub> =10V, V <sub>GS</sub> =0, f=1MHz
C <sub>oss</sub>	-	7.2	-		
C <sub>rSS</sub>	-	4	-		
t <sub>d(ON)</sub>	-	4	-	ns	V <sub>DS</sub> =30V, I <sub>D</sub> =100mA, V <sub>GS</sub> =4.5V R <sub>G</sub> =10Ω
t <sub>r</sub>	-	7	-		
t <sub>d(OFF)</sub>	-	15	-		
t <sub>f</sub>	-	15	-		
Q <sub>g</sub>	-	0.76	-	nC	V <sub>DS</sub> =30V, I <sub>D</sub> =250mA, V <sub>GS</sub> =4.5V
Q <sub>gs</sub>	-	0.085	-		
Q <sub>gd</sub>	-	0.26	-		
<b>Source-Drain Diode</b>					
*V <sub>SD</sub>	-	0.79	1.2	V	V <sub>GS</sub> =0V, I <sub>S</sub> =200mA

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

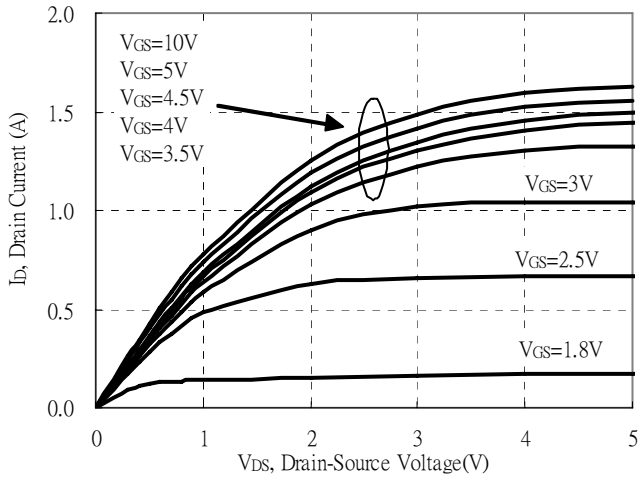
**Ordering Information**

Device	Package	Shipping	Marking
MTN002N05Y3	SOT-723 (Pb-free package)	8000 pcs / Tape & Reel	RH

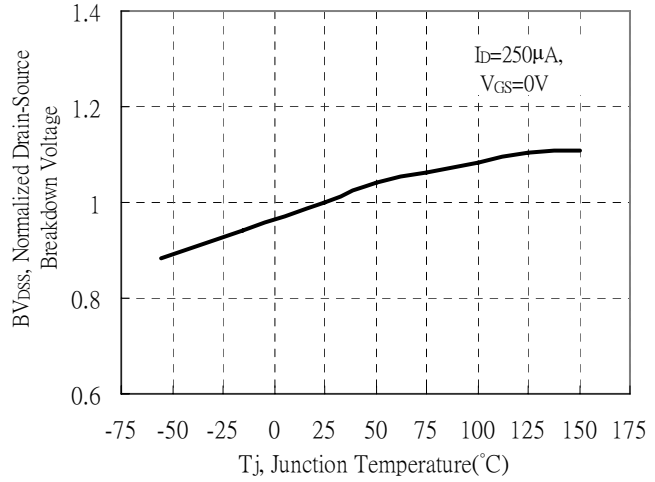


## Typical Characteristics

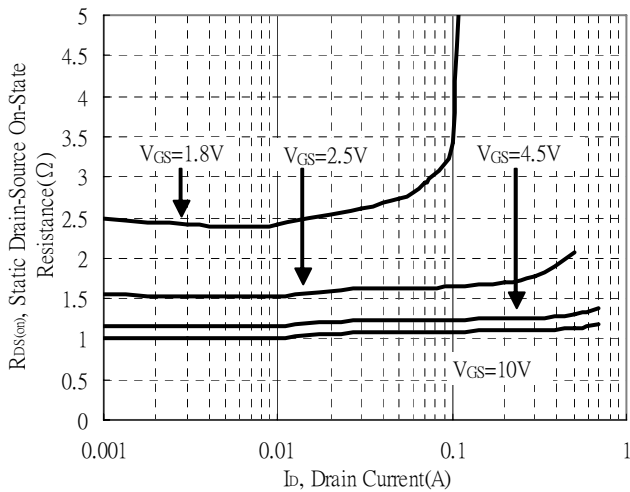
Typical Output Characteristics



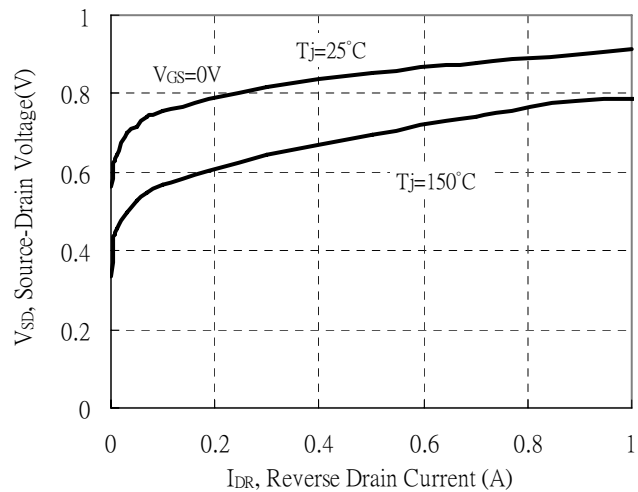
Breakdown Voltage vs Ambient Temperature



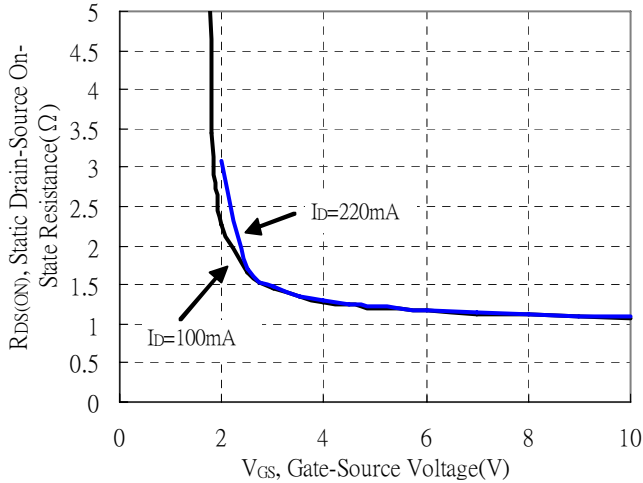
Static Drain-Source On-State resistance vs Drain Current



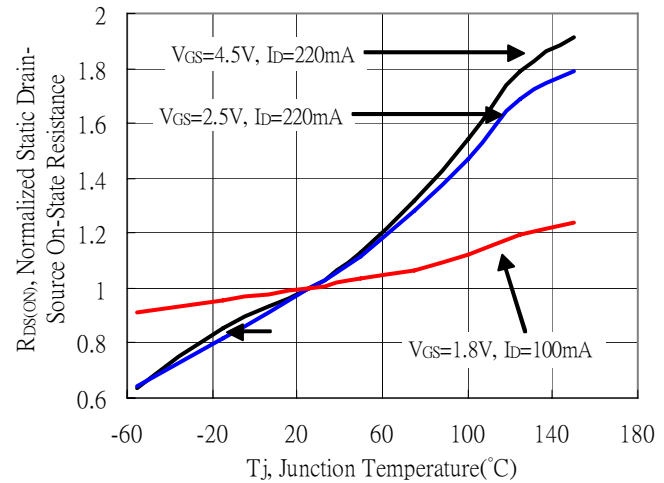
Reverse Drain Current vs Source-Drain Voltage



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



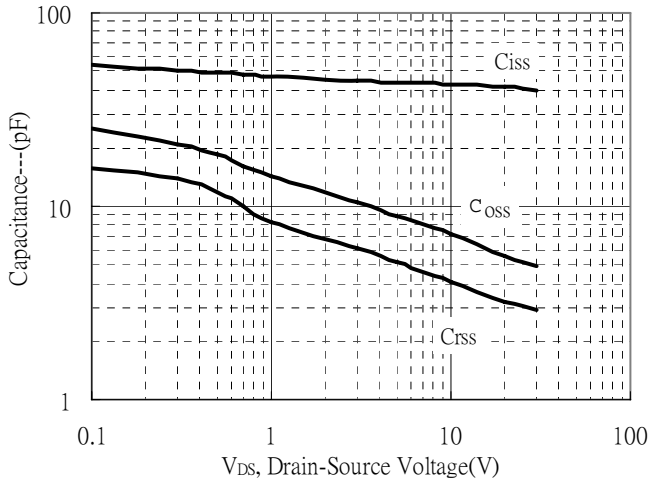
Drain-Source On-State Resistance vs Junction Temperature



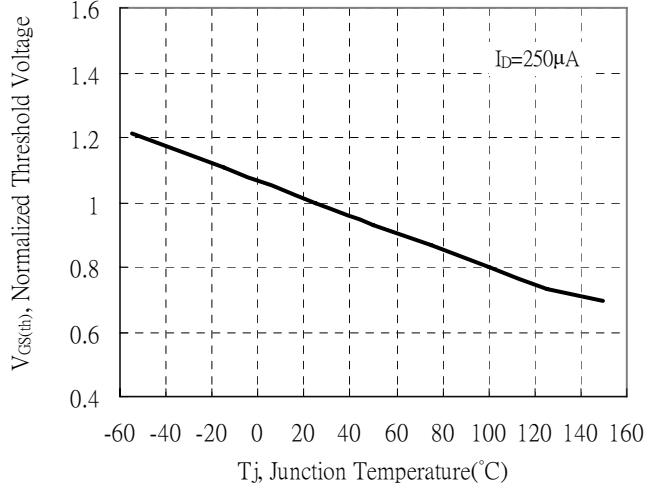


**Typical Characteristics(Cont.)**

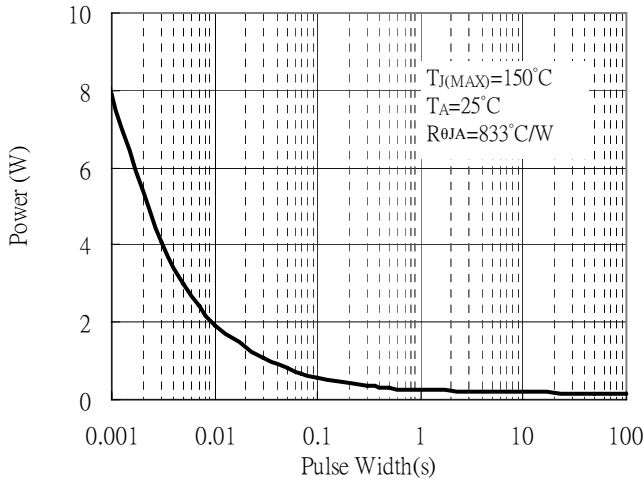
Capacitance vs Drain-to-Source Voltage



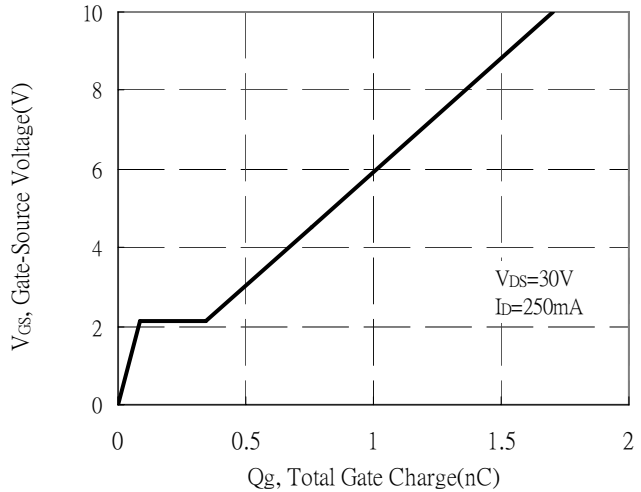
Threshold Voltage vs Junction Temperature



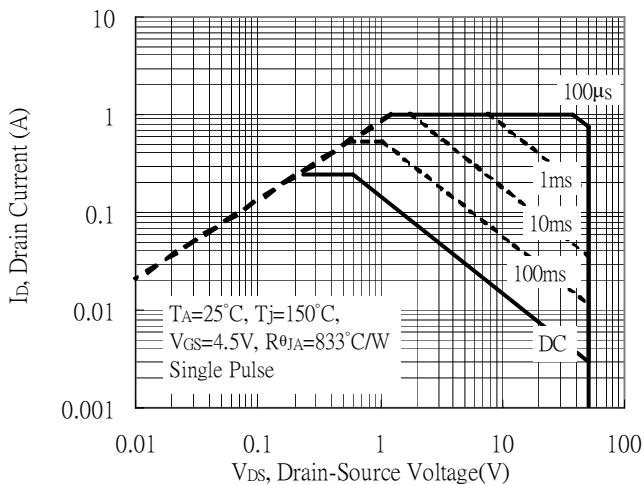
Single Pulse Power Rating, Junction to Ambient  
 (Note on page 2)



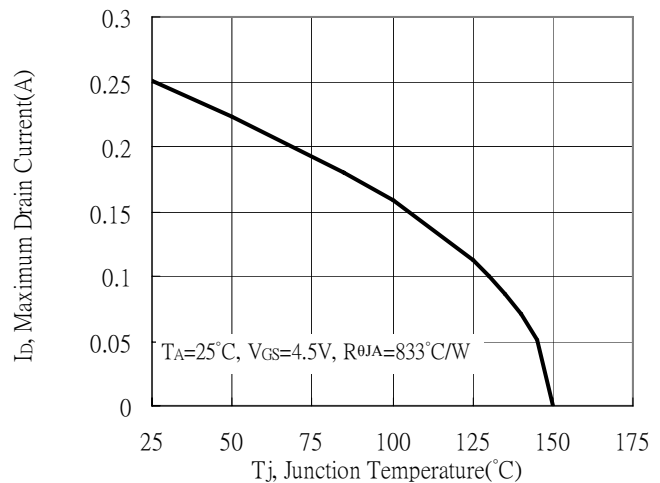
Gate Charge Characteristics



Maximum Safe Operating Area



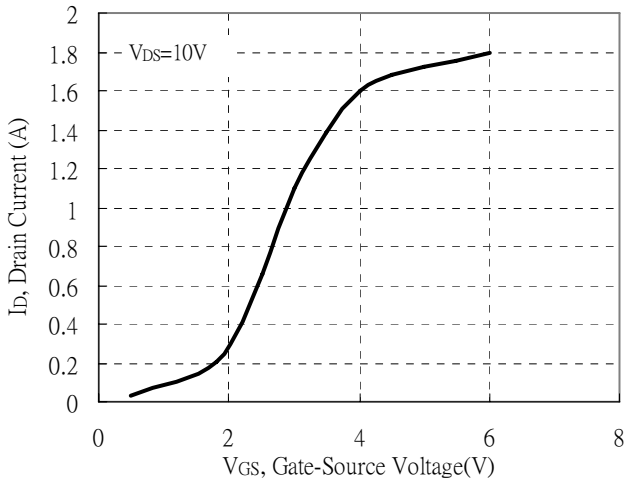
Maximum Drain Current vs Junction Temperature



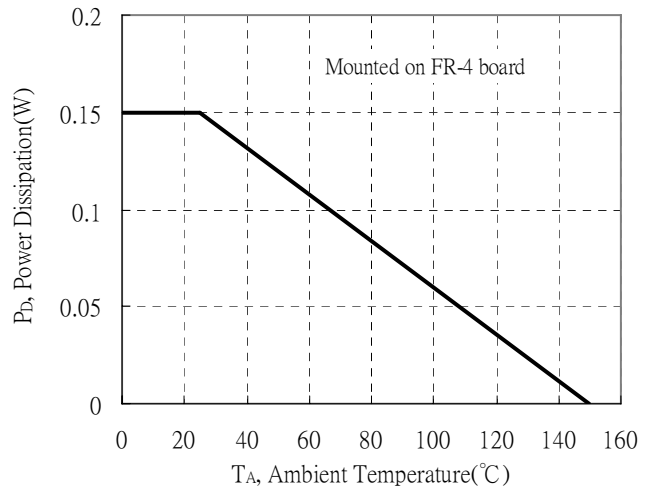


**Typical Characteristics(Cont.)**

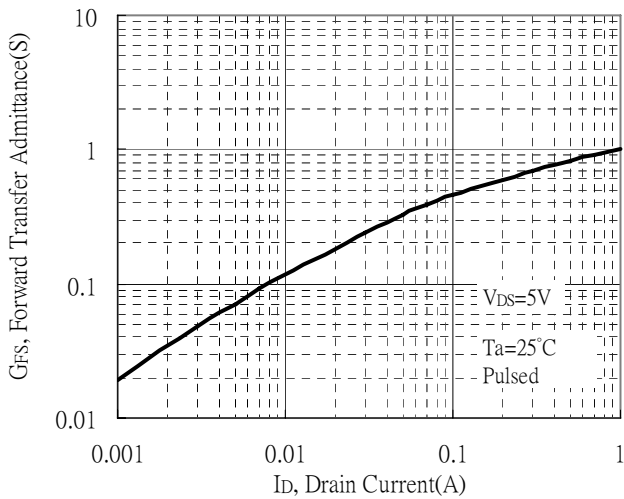
Typical Transfer Characteristics



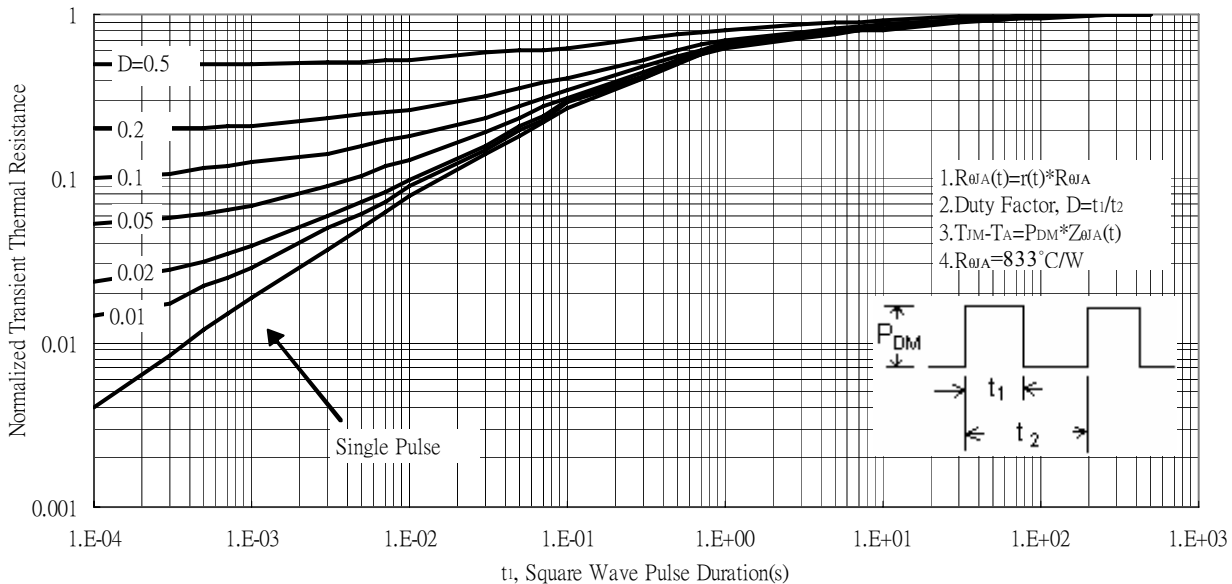
Power Derating Curve



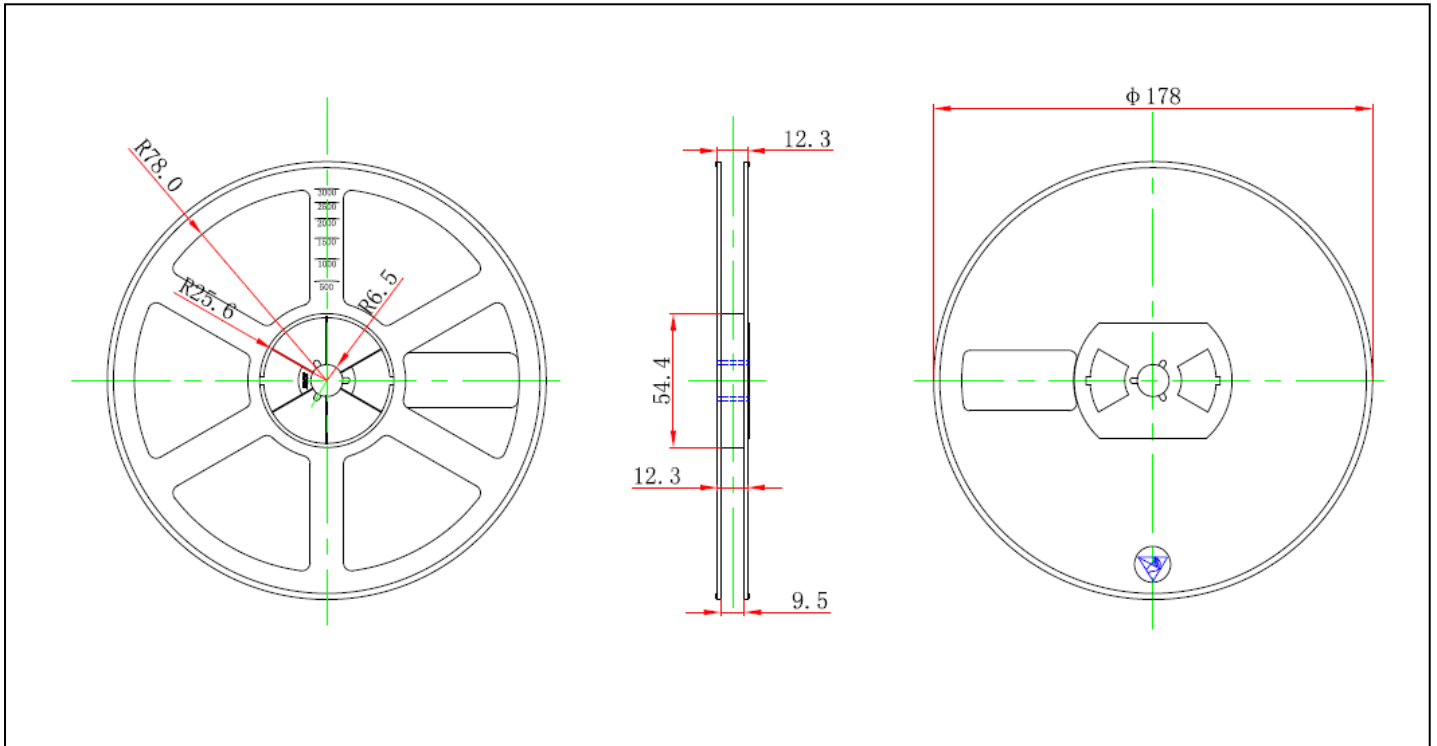
Forward Transfer Admittance vs Drain Current



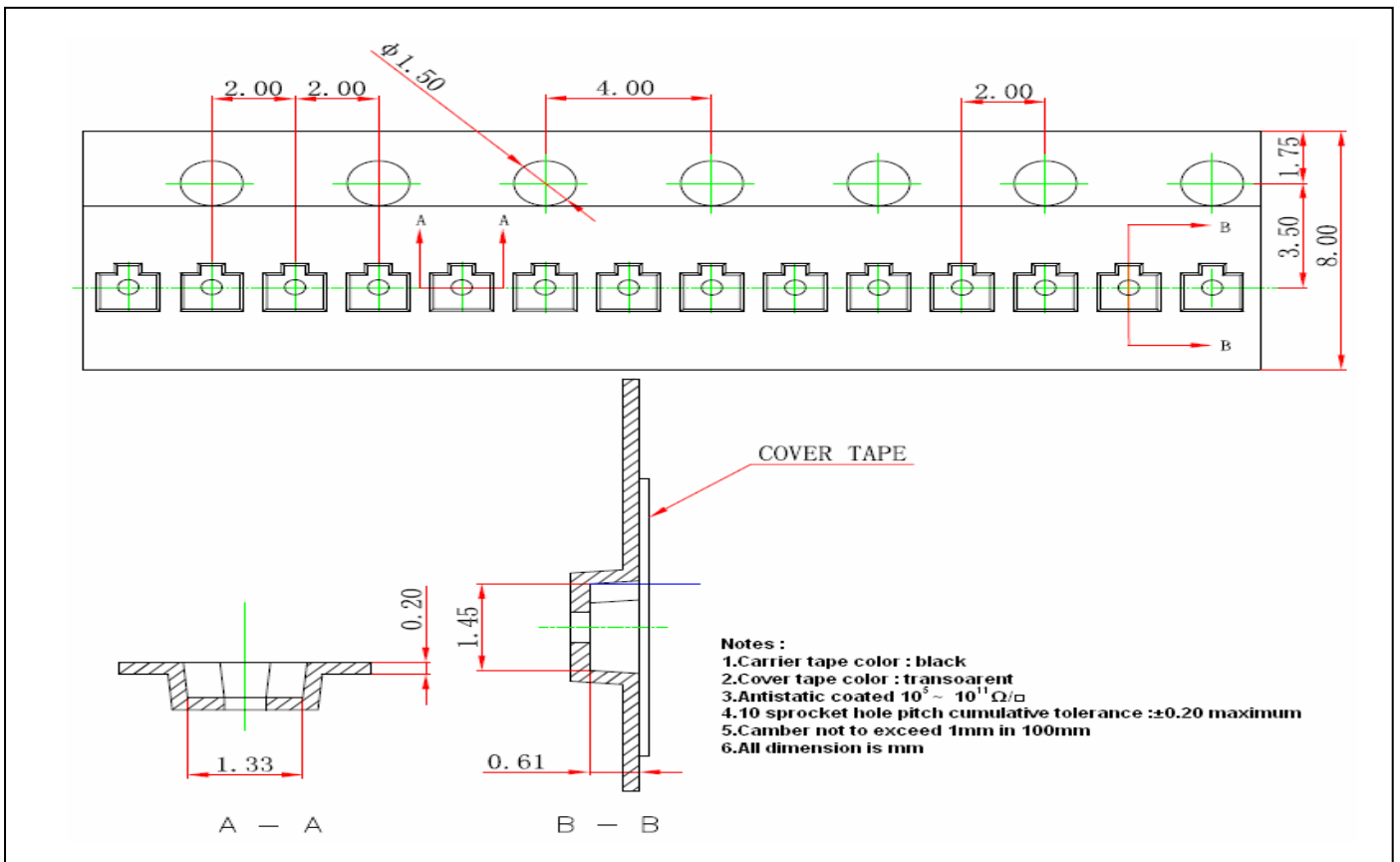
Transient Thermal Response Curves



**Reel Dimension**



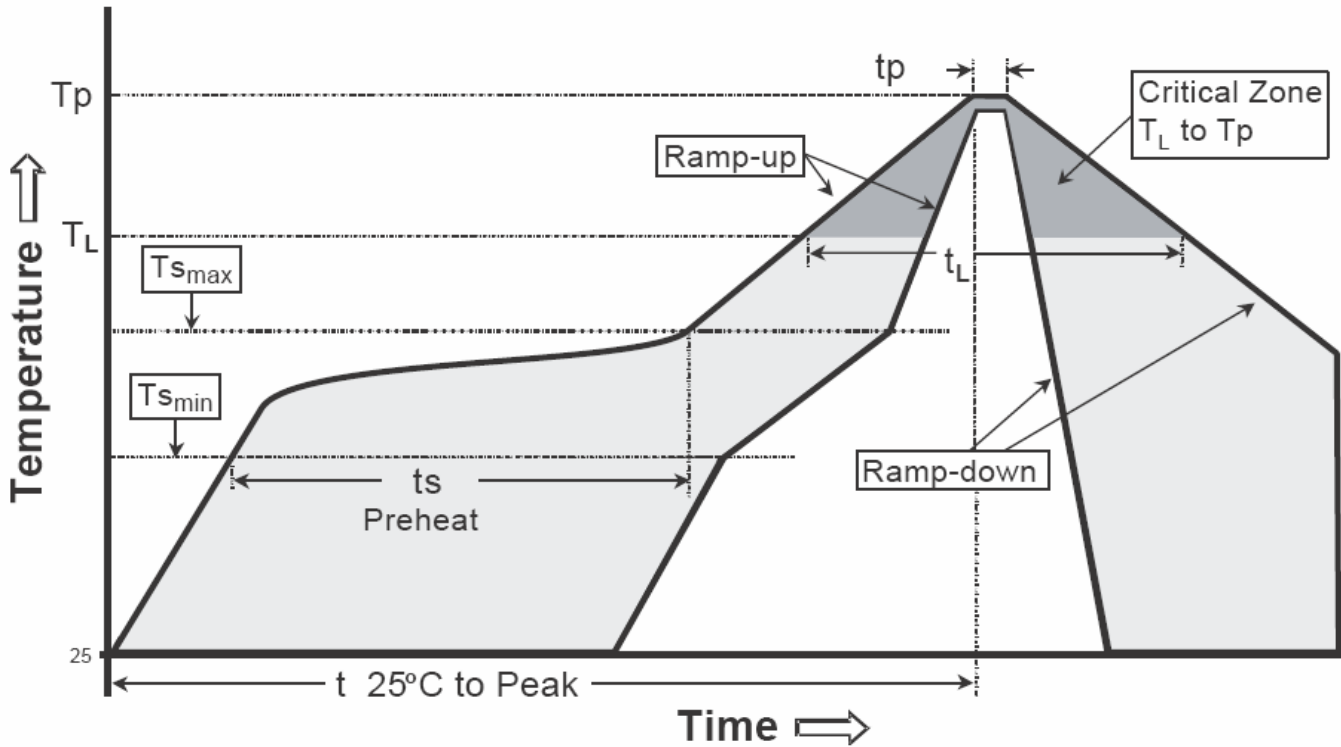
**Carrier Tape Dimension**



**Recommended wave soldering condition**

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

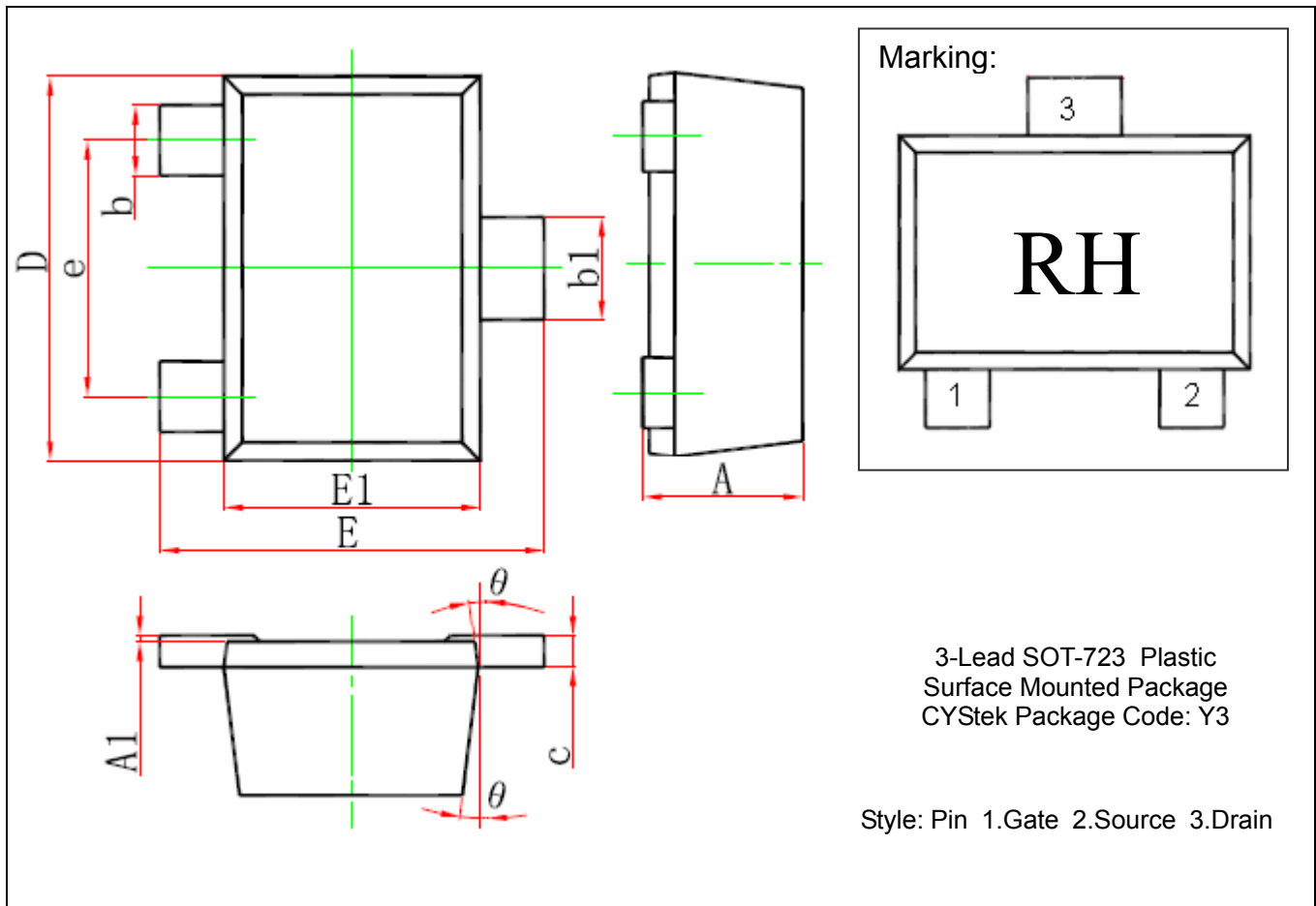
**Recommended temperature profile for IR reflow**



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> ) -Temperature Max(T <sub>s max</sub> ) -Time(ts <sub> min</sub> to ts <sub> max</sub> )	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
Time maintained above: -Temperature (T <sub>L</sub> ) - Time (t <sub>L</sub> )	183°C 60-150 seconds	217°C 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.

**SOT-723 Dimension**



\*Typical

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.000	0.500	0.000	0.020	D	1.150	1.250	0.045	0.049
A1	0.000	0.050	0.000	0.002	E	1.150	1.250	0.045	0.049
b	0.170	0.270	0.007	0.011	E1	0.750	0.850	0.030	0.033
b1	0.270	0.370	0.011	0.015	e	0.800*		0.031*	
c	0.000	0.150	0.000	0.006	$\theta$	7° REF		7° REF	

- 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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