

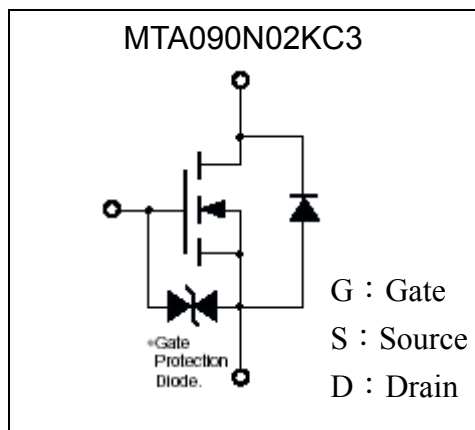
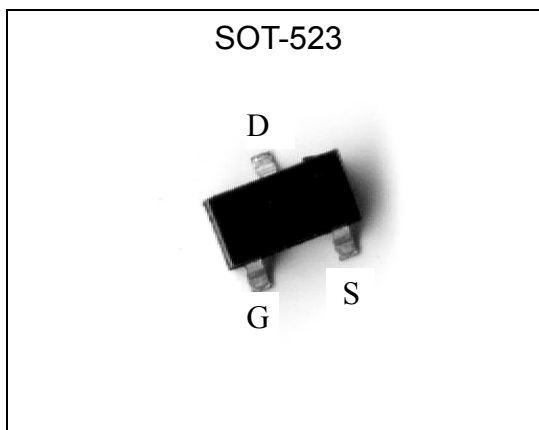
**20V N-Channel Enhancement Mode MOSFET**

# MTA090N02KC3

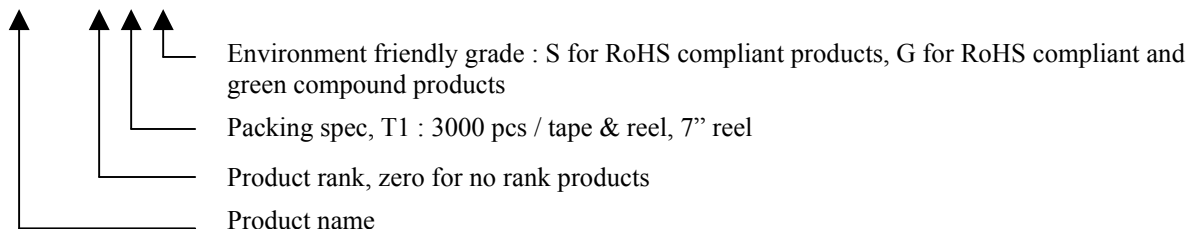
$BV_{DSS}$	20V
$I_D @ V_{GS}=4V, T_A=25^\circ C$	1.4A
$R_{DS(on)} @ V_{GS}=4V, I_D=1A$	63m $\Omega$ (typ)
$R_{DS(on)} @ V_{GS}=2.5V, I_D=1A$	83m $\Omega$ (typ)
$R_{DS(on)} @ V_{GS}=1.8V, I_D=500mA$	160m $\Omega$ (typ)

**Features**

- Simple drive requirement
- Small package outline
- Pb-free lead plating and halogen-free package

**Symbol**

**Outline**

**Ordering Information**

Device	Package	Shipping
MTA090N02KC3-0-T1-G	SOT-523 (Pb-free lead plating package)	3000 pcs / tape & reel





**Absolute Maximum Ratings (Ta=25°C)**

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V <sub>DS</sub>	20	V
Gate-Source Voltage	V <sub>GS</sub>	±8	
Continuous Drain Current @ T <sub>A</sub> =25°C, V <sub>GS</sub> =4V	I <sub>D</sub>	1.4 (Note 3)	A
Continuous Drain Current @ T <sub>A</sub> =70°C, V <sub>GS</sub> =4V		1.1 (Note 3)	
Pulsed Drain Current (Notes 1, 2)	I <sub>DM</sub>	6.0	
Power Dissipation	P <sub>D</sub>	280 (Note 3)	mW
ESD susceptibility	V <sub>ESD</sub>	1200 (Note 4)	V
Operating Junction and Storage Temperature	T <sub>j</sub> , T <sub>stg</sub>	-55~+150	°C

**Thermal Performance**

Parameter	Symbol	Limit	Unit
Thermal Resistance, Junction-to-Ambient, max (Note 3)	R <sub>θja</sub>	450	°C/W
Thermal Resistance, Junction-to-Case, max	R <sub>θjc</sub>	312	

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

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
BV <sub>DSS</sub>	20	-	-	V	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA
V <sub>GS(th)</sub>	0.3	-	1.0		V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA
I <sub>GSS</sub>	-	-	±10	μA	V <sub>GS</sub> =±8V, V <sub>DS</sub> =0V
I <sub>DSS</sub>	-	-	1		V <sub>DS</sub> =20V, V <sub>GS</sub> =0V
	-	-	10		V <sub>DS</sub> =16V, V <sub>GS</sub> =0V (T <sub>j</sub> =70°C)
*R <sub>DS(ON)</sub>	-	63	100	mΩ	V <sub>GS</sub> =4V, I <sub>D</sub> =1A
	-	83	120		V <sub>GS</sub> =2.5V, I <sub>D</sub> =1A
	-	160	250		V <sub>GS</sub> =1.8V, I <sub>D</sub> =500mA
*G <sub>FS</sub>	-	3.8	-	S	V <sub>DS</sub> =3V, I <sub>D</sub> =1A
<b>Dynamic</b>					
C <sub>iss</sub>	-	159	-	pF	V <sub>DS</sub> =15V, V <sub>GS</sub> =0, f=1MHz
C <sub>oss</sub>	-	26	-		
C <sub>rss</sub>	-	27	-		
t <sub>d(ON)</sub>	-	4.4	-	ns	V <sub>DS</sub> =10V, I <sub>D</sub> =200mA, V <sub>GS</sub> =4.5V, R <sub>G</sub> =10Ω
t <sub>r</sub>	-	17.8	-		
t <sub>d(OFF)</sub>	-	14.8	-		
t <sub>f</sub>	-	17	-		
Q <sub>g</sub>	-	2.6	-	nC	V <sub>DS</sub> =10V, I <sub>D</sub> =200mA, V <sub>GS</sub> =4.5V
Q <sub>gs</sub>	-	0.56	-		
Q <sub>gd</sub>	-	0.4	-		

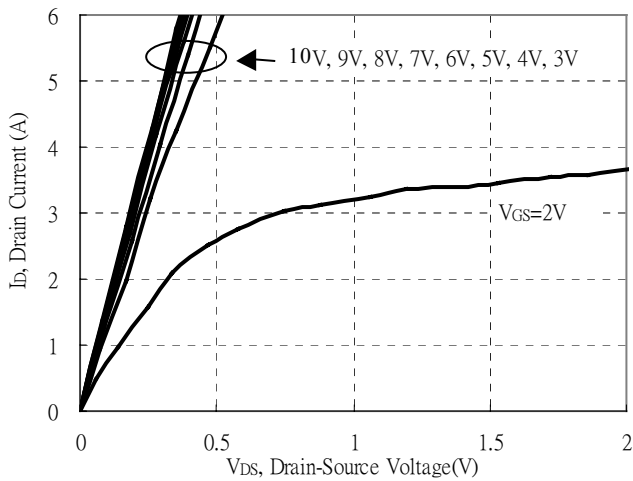


Source-Drain Diode					
*V <sub>SD</sub>	-	0.84	1.2	V	V <sub>GS</sub> =0V, I <sub>S</sub> =1A
*t <sub>rr</sub>	-	4.6	-	ns	I <sub>F</sub> =0.2A, dI <sub>F</sub> /dt=100A/μs
*Q <sub>rr</sub>	-	1.0	-	nC	

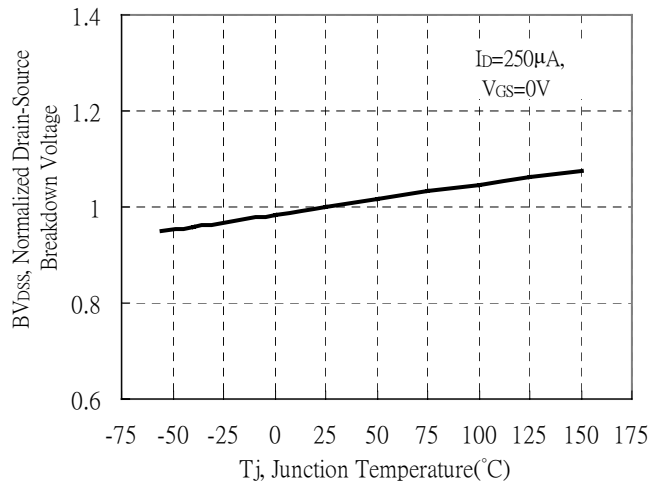
\*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

### Typical Characteristics

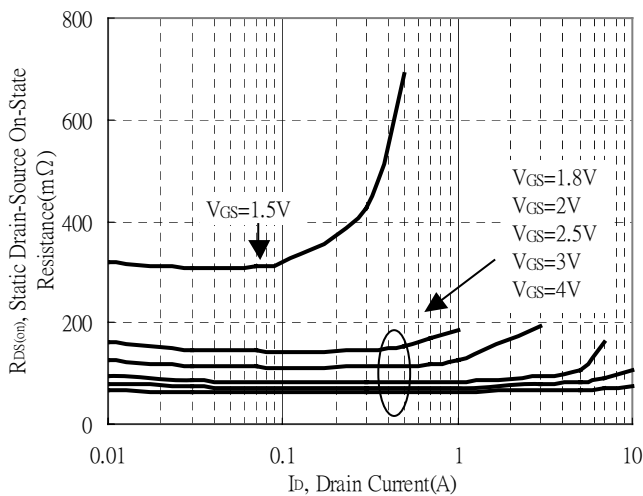
Typical Output Characteristics



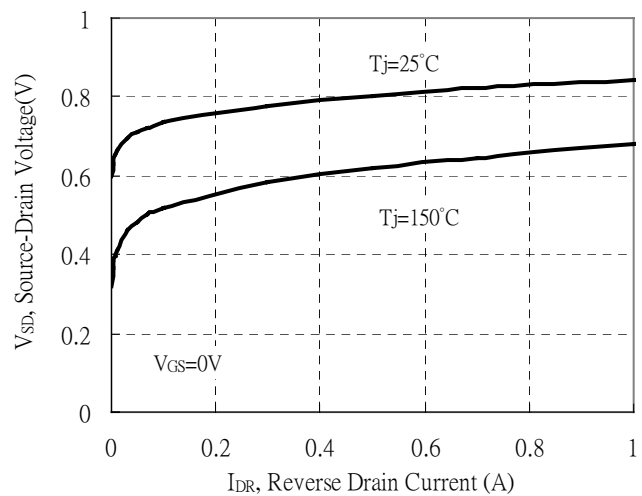
Brekdown Voltage vs Ambient Temperature



Static Drain-Source On-State resistance vs Drain Current

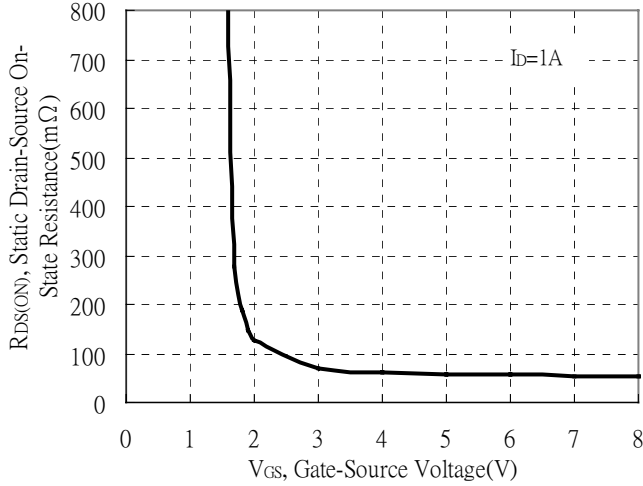


Reverse Drain Current vs Source-Drain Voltage

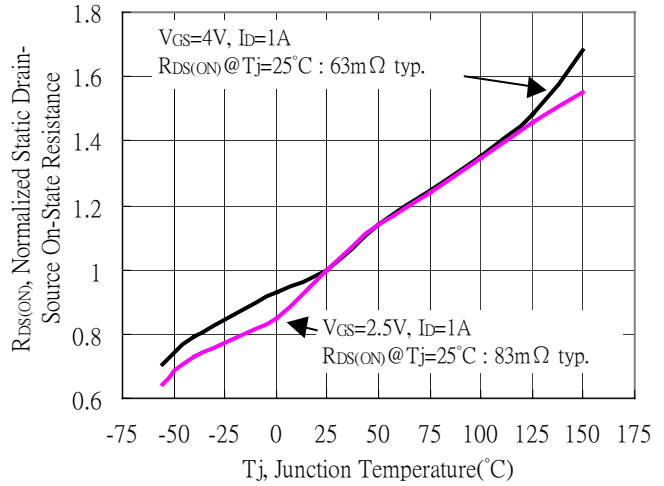


## Typical Characteristics(Cont.)

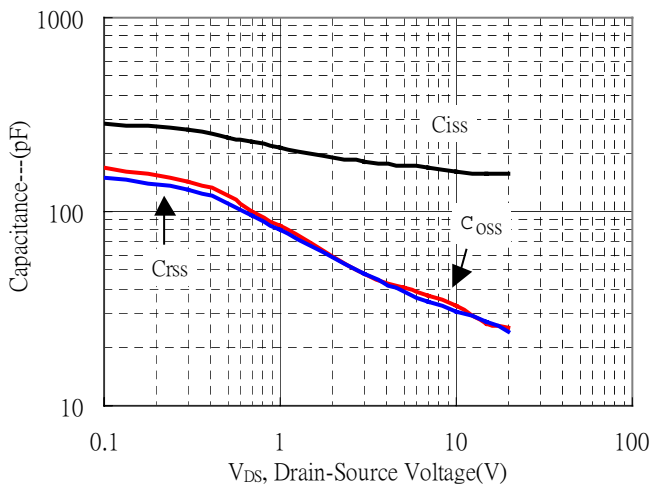
Static Drain-Source On-State Resistance vs Gate-Source Voltage



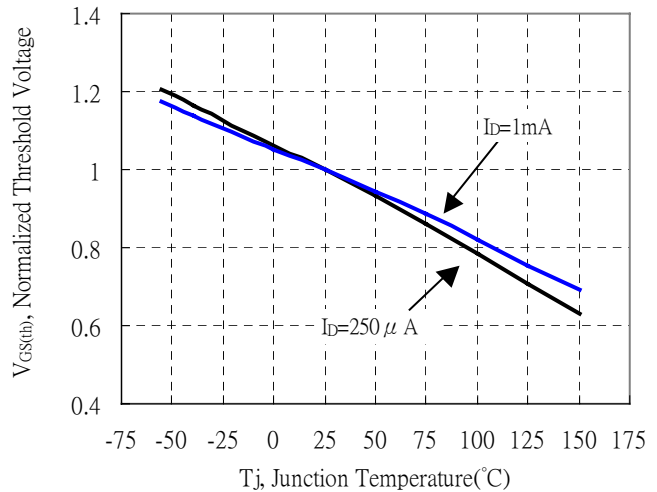
Drain-Source On-State Resistance vs Junction Temperature



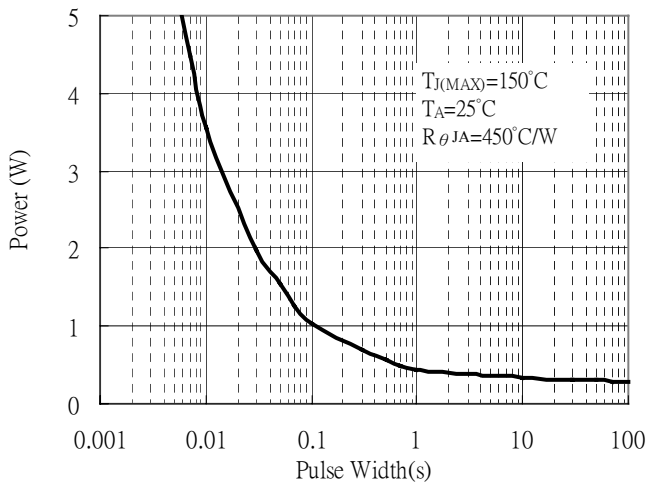
Capacitance vs Drain-to-Source Voltage



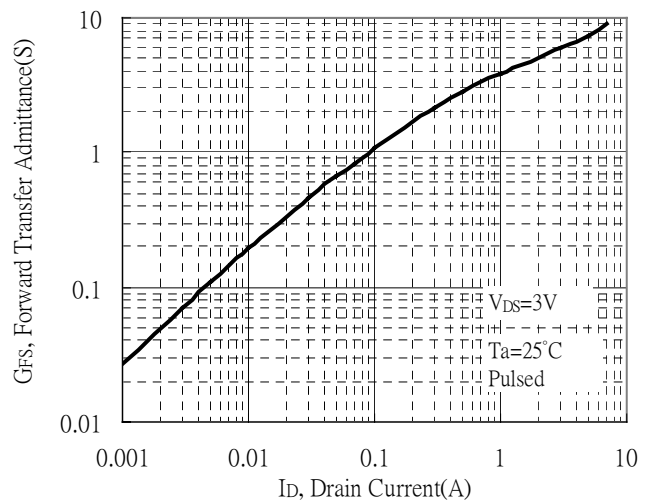
Threshold Voltage vs Junction Temperature



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

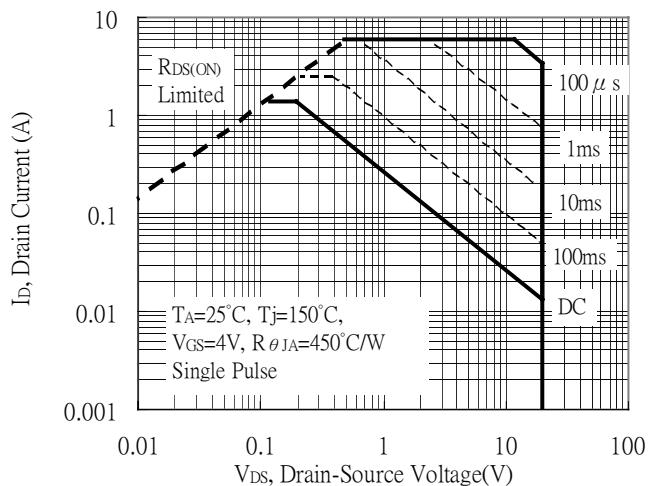


Forward Transfer Admittance vs Drain Current

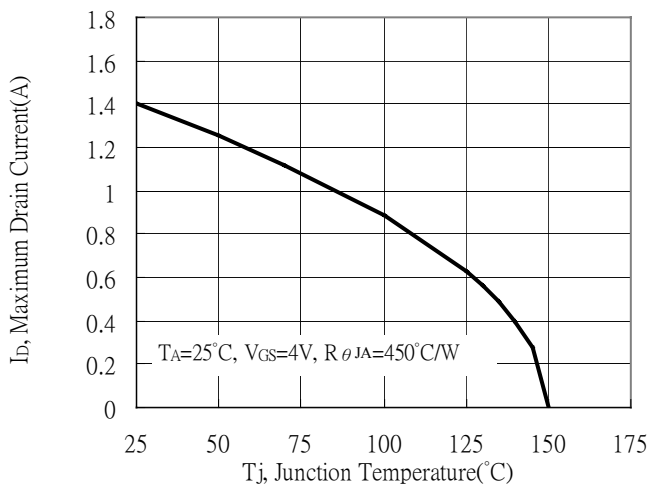


## Typical Characteristics(Cont.)

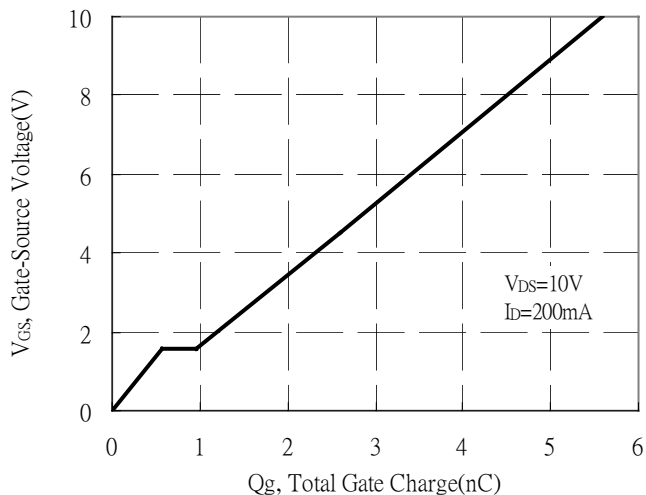
Maximum Safe Operating Area



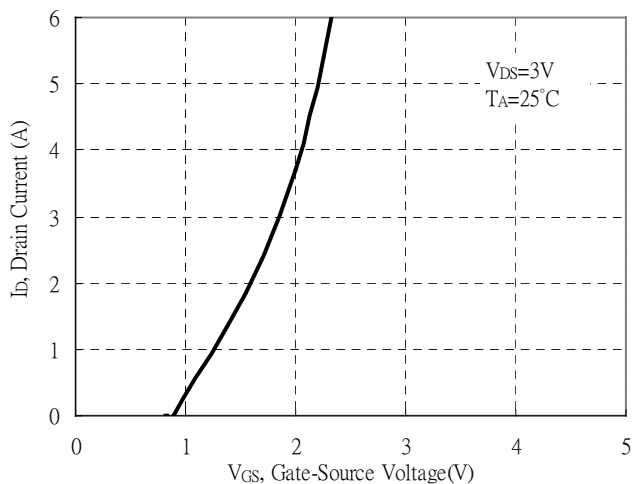
Maximum Drain Current vs Junction Temperature



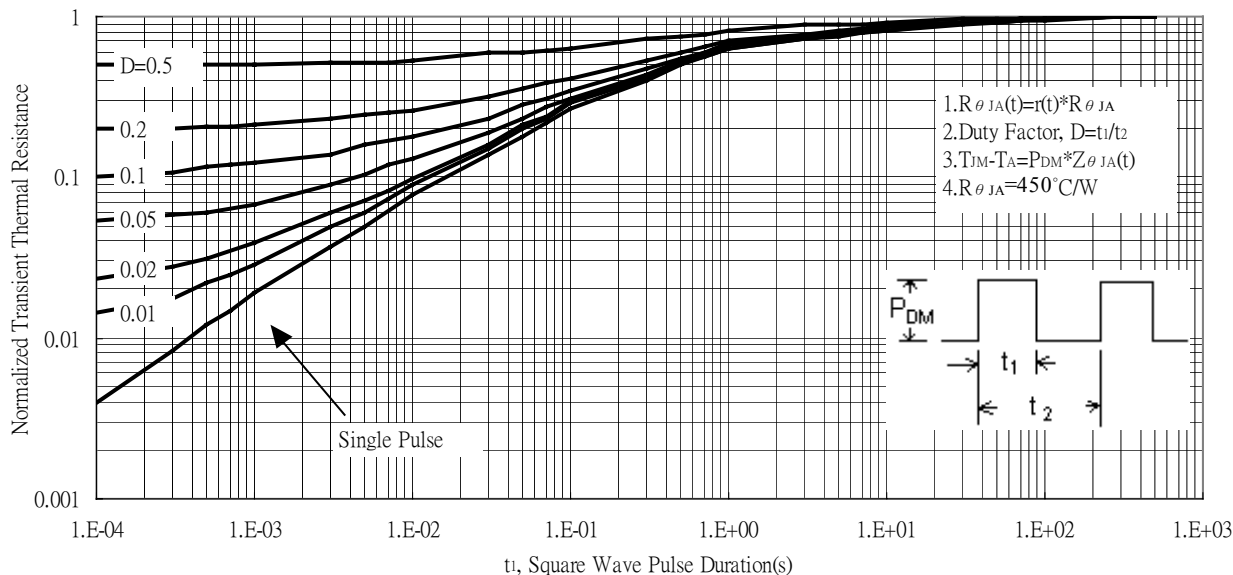
Gate Charge Characteristics



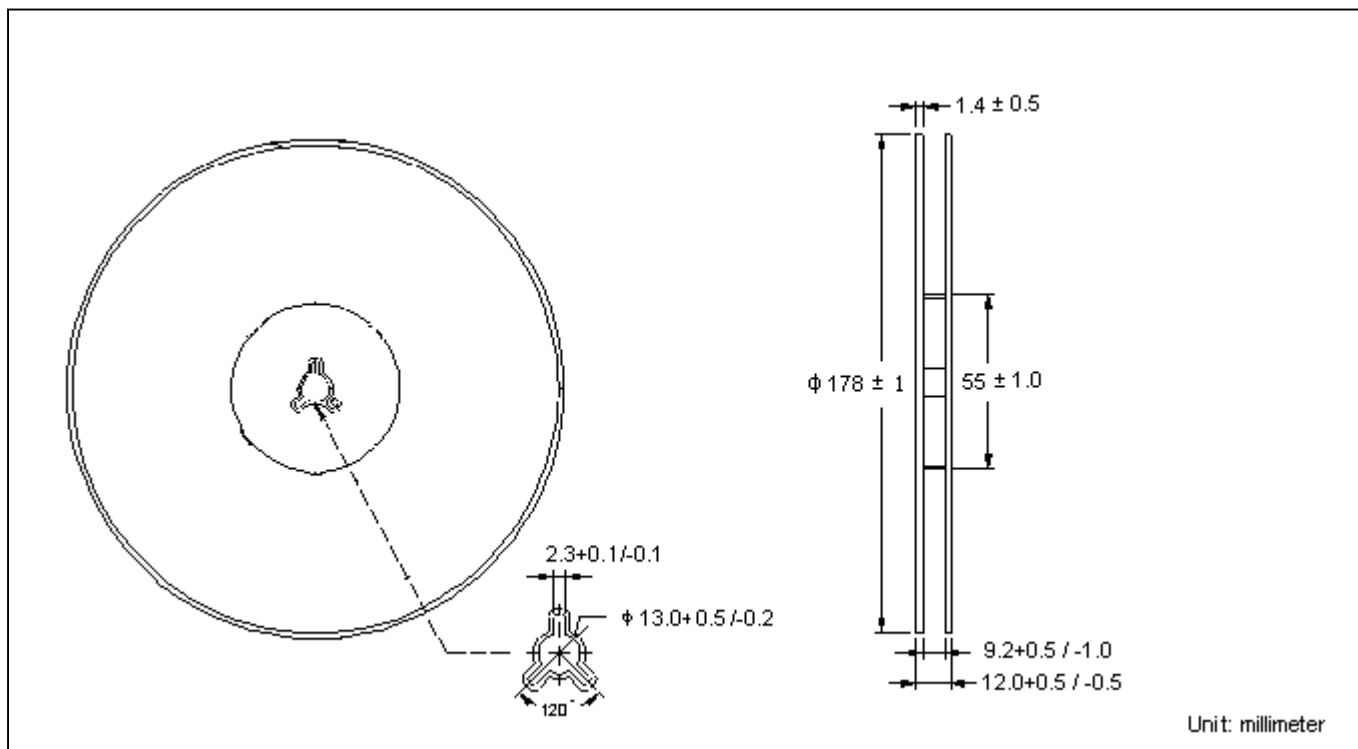
Typical Transfer Characteristics



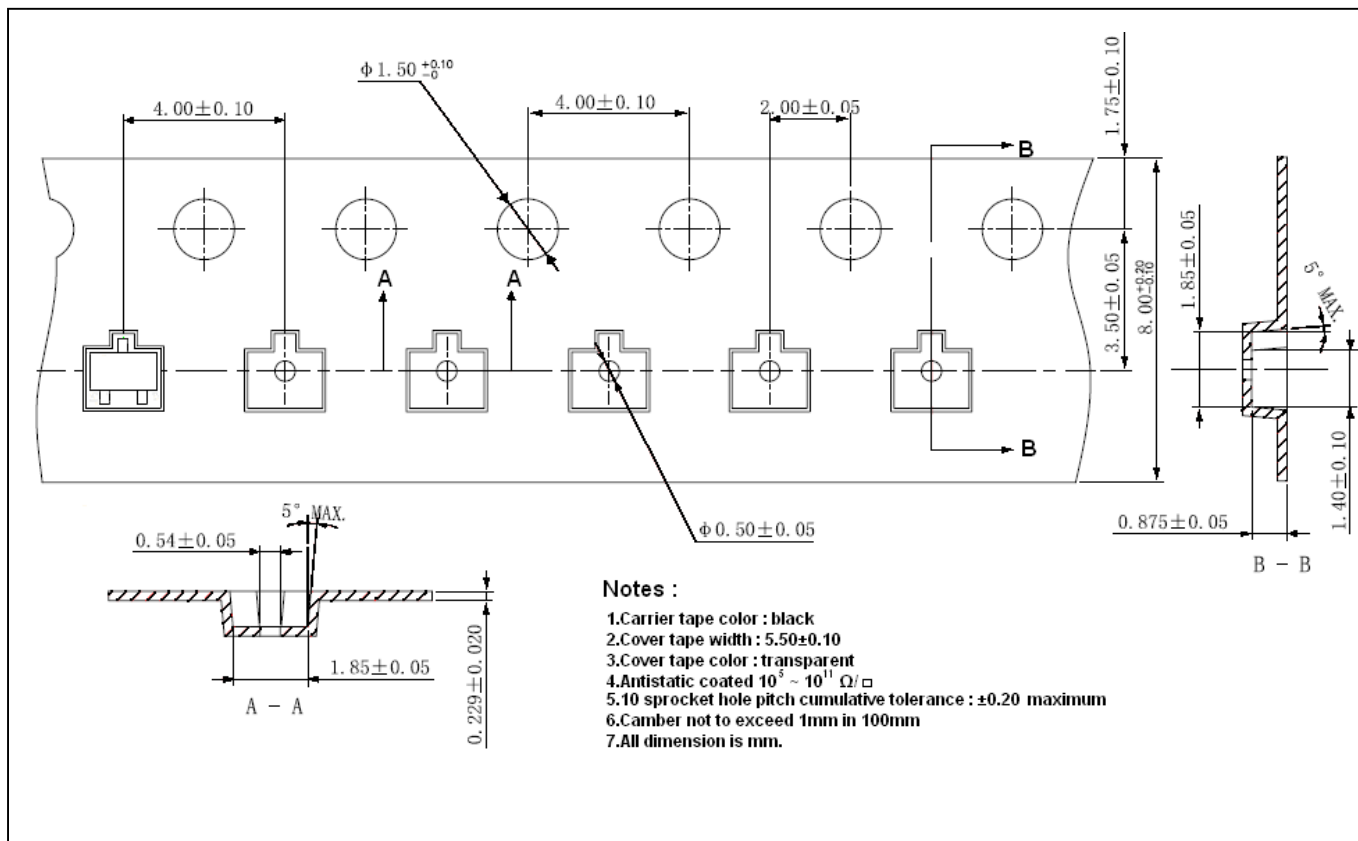
Transient Thermal Response Curves



### Reel Dimension

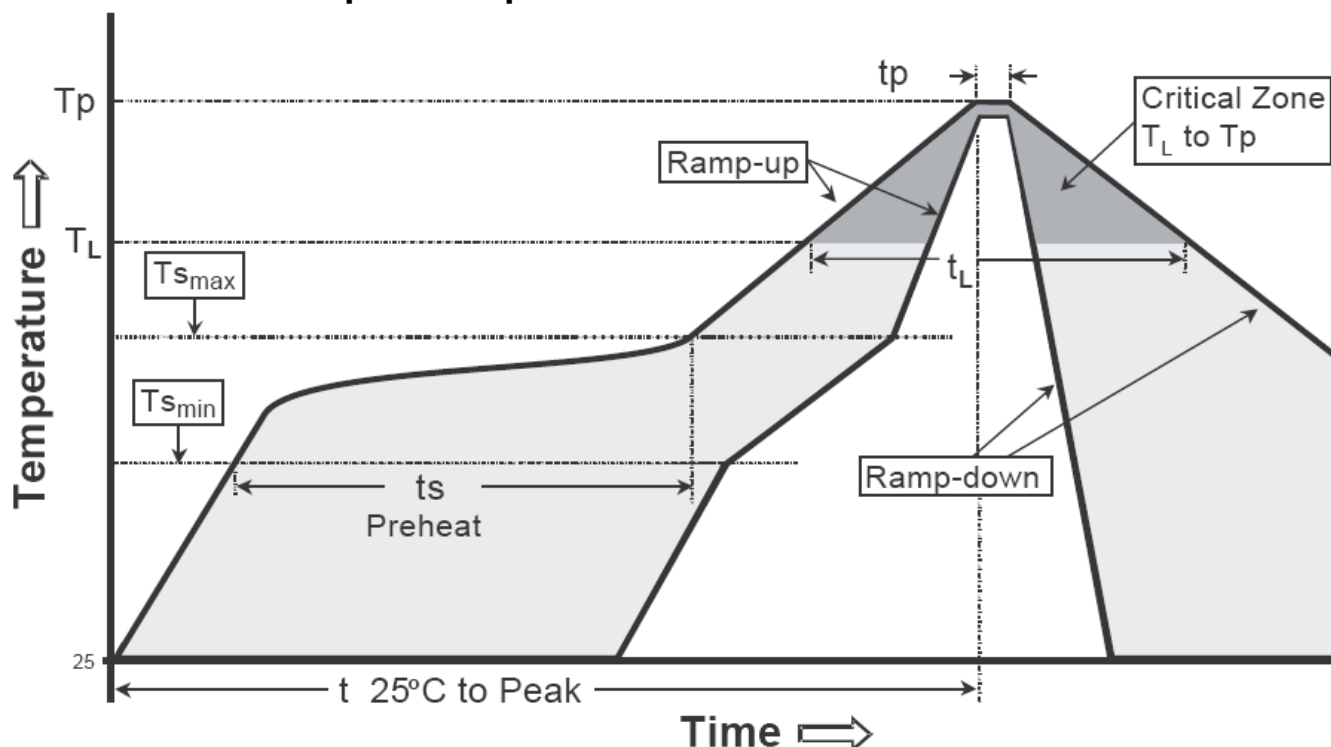


### Carrier Tape Dimension



**Recommended wave soldering condition**

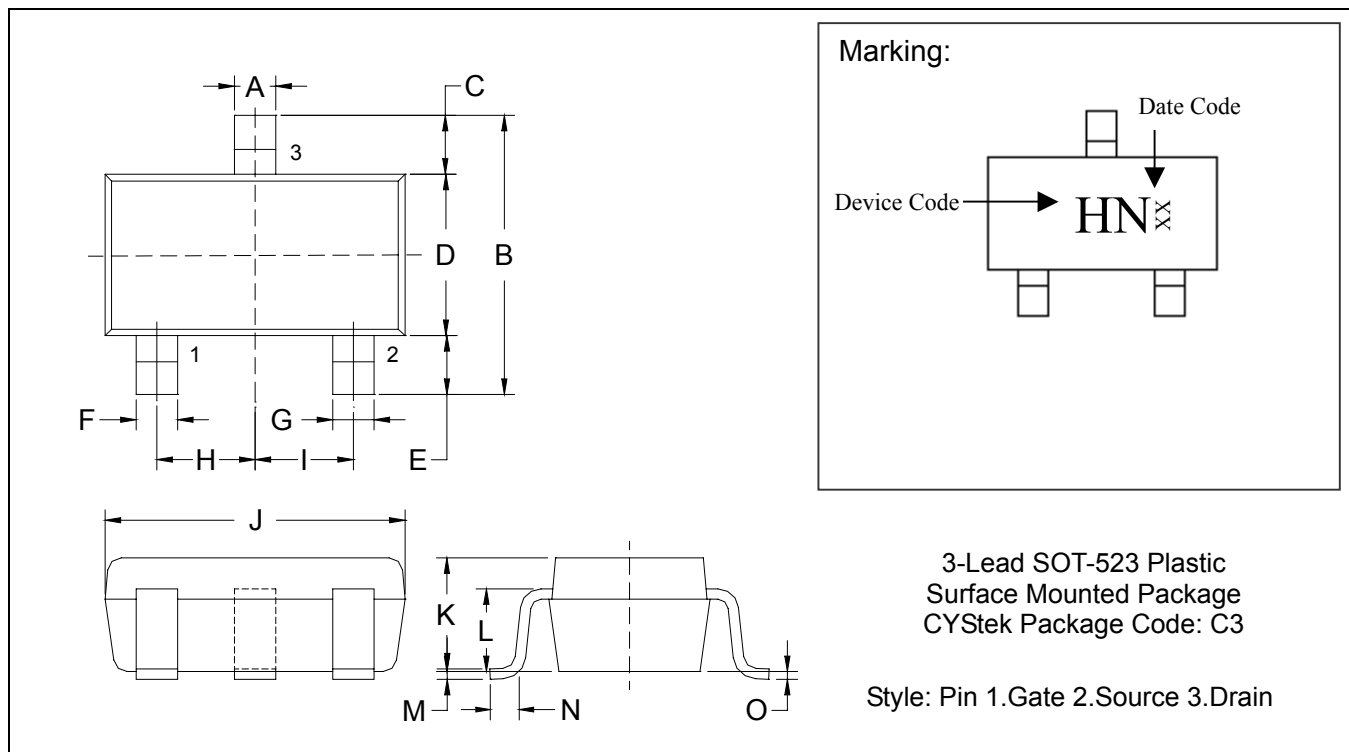
Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

**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(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.

**SOT-523 Dimension**



3-Lead SOT-523 Plastic  
 Surface Mounted Package  
 CYStek Package Code: C3

Style: Pin 1.Gate 2.Source 3.Drain

\*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.0079	0.0157	0.20	0.40	I	*0.0197	-	*0.50	-
B	0.0591	0.0669	1.50	1.70	J	0.0610	0.0650	1.55	1.65
C	0.0118	0.0197	0.30	0.50	K	0.0276	0.0315	0.70	0.80
D	0.0295	0.0335	0.75	0.85	L	0.0224	0.0248	0.57	0.63
E	0.0118	0.0197	0.30	0.50	M	0.0020	0.0059	0.05	0.15
F	0.0039	0.0118	0.10	0.30	N	0.0039	0.0118	0.10	0.30
G	0.0039	0.0118	0.10	0.30	O	0	0.0031	0	0.08
H	*0.0197	-	*0.50	-					

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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