

20V N-CHANNEL Enhancement Mode MOSFET

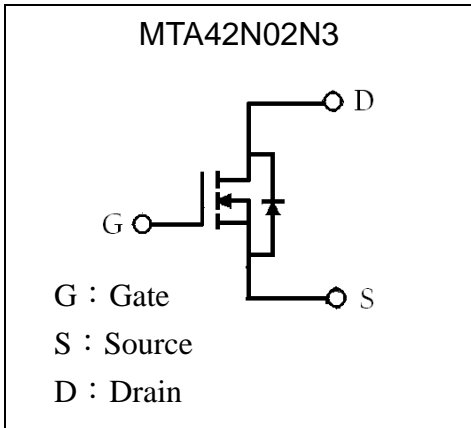
MTA42N02N3

BV_{DSS}	20V
$I_D @ V_{GS}=4.5V, T_A=25^\circ C$	4A
$R_{DS(on)(MAX)} @ V_{GS}=4.5V, I_D=3.6A$	30mΩ (typ.)
$R_{DS(on)(MAX)} @ V_{GS}=2.5V, I_D=3.1A$	38mΩ (typ.)

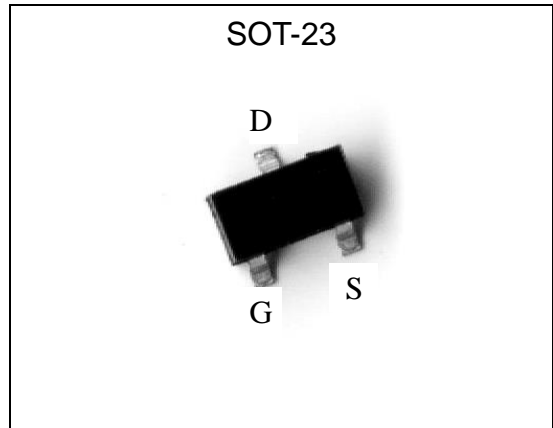
Features

- Simple drive requirement
- Small package outline
- Capable of 2.5V gate drive
- Pb-free lead plating and halogen-free package

Symbol

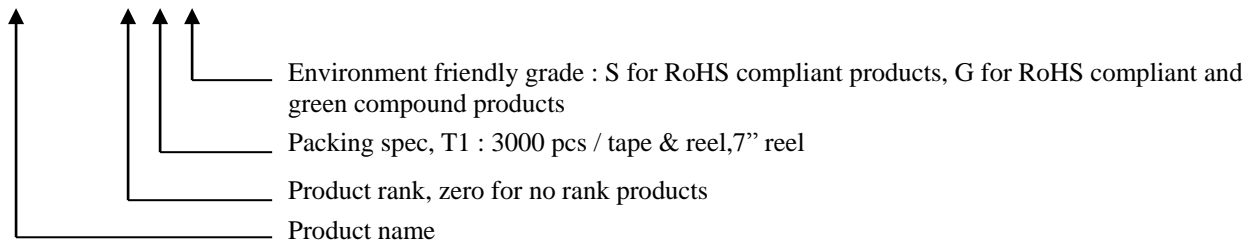


Outline



Ordering Information

Device	Package	Shipping
MTA42N02N3-0-T1-G	SOT-23 (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel





Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V _{DS}	20	V
Gate-Source Voltage	V _{GS}	±8	
Continuous Drain Current @ V _{GS} =4.5V, T _A =25°C (Note 3)	I _D	4	A
Continuous Drain Current @ V _{GS} =4.5V, T _A =70°C (Note 3)		3.2	
Pulsed Drain Current (Notes 1, 2)	I _{DM}	16	
Maximum Power Dissipation@ T _A =25°C	P _D	1.38 (Note 3)	W
Linear Derating Factor		0.01	W/°C
Operating Junction and Storage Temperature	T _j , T _{stg}	-55~+150	°C

- Note : 1. Pulse width limited by maximum junction temperature.
 2. Pulse width ≤ 300μs, duty cycle ≤ 2%.
 3. Surface mounted on 1 in² copper pad of FR-4 board, t ≤ 5s; 270°C/W when mounted on minimum copper pad.

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance, Junction-to-Ambient, max	R _{θJA}	90	°C/W
Thermal Resistance, Junction-to-Case, max	R _{θJC}	80	

Note : Surface mounted on 1 in² copper pad of FR-4 board, t ≤ 5s; 270°C/W when mounted on minimum copper pad.

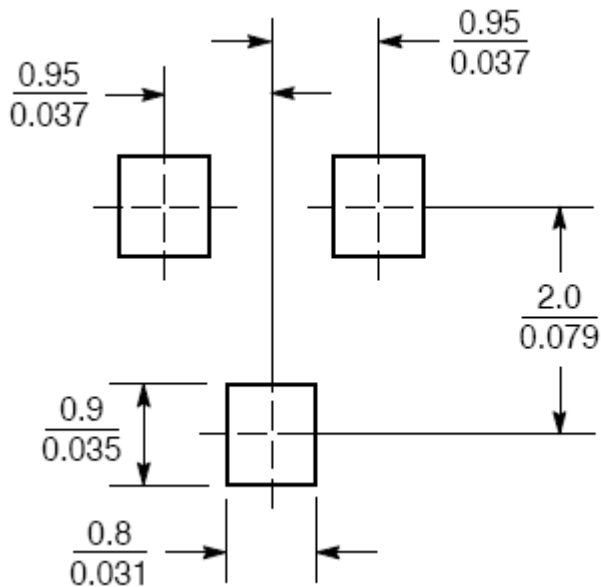
Electrical Characteristics (T_j=25°C, unless otherwise noted)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	20	-	-	V	V _{GS} =0V, I _D =250μA
ΔBV _{DSS} /ΔT _j	-	0.015	-	V/°C	Reference to 25°C, I _D =1mA
V _{GS(th)}	0.35	-	0.7	V	V _{DS} =V _{GS} , I _D =250μA
I _{GSS}	-	-	±100	nA	V _{GS} =±8V, V _{DS} =0V
I _{DSS}	-	-	1	μA	V _{DS} =16V, V _{GS} =0V
	-	-	10		V _{DS} =16V, V _{GS} =0V (T _j =70°C)
*R _{DS(ON)}	-	30	42	mΩ	I _D =3.6A, V _{GS} =4.5V
	-	38	70		I _D =3.1A, V _{GS} =2.5V
*G _{FS}	-	7.5	-	S	V _{DS} =5V, I _D =3.6A
Dynamic					
C _{iss}	-	287	-	pF	V _{DS} =10V, V _{GS} =0V, f=1MHz
C _{oss}	-	51	-		
C _{rss}	-	46	-		

$t_{d(ON)}$	-	3.8	-	ns	$V_{DS}=10V, I_D=3.6A, V_{GS}=5V$ $R_G=6\Omega, R_D=2.8\Omega$
t_r	-	14.6	-		
$t_{d(OFF)}$	-	24.8	-		
t_f	-	6.8	-		
Q_g	-	5.1	-	nC	$V_{DS}=10V, I_D=3.6A, V_{GS}=4.5V$
Q_{gs}	-	0.5	-		
Q_{gd}	-	1.4	-		
Source-Drain Diode					
$*V_{SD}$	-	0.83	1.2	V	$V_{GS}=0V, I_S=1.6A$
I_S	-	-	1	A	$V_D=V_G=0V, V_S=1.2V$
I_{SM}	-	-	10		

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

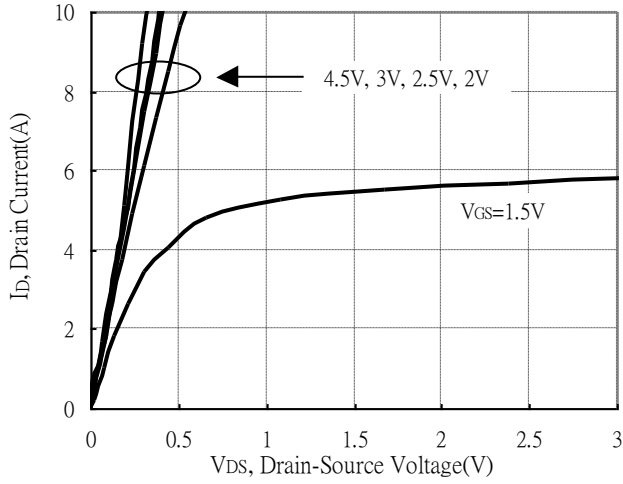
Recommended Soldering Footprint



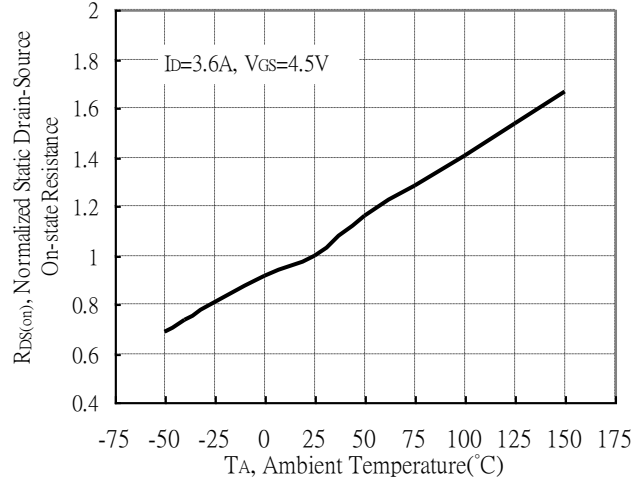
Unit : $\frac{mm}{inches}$

Typical Characteristics

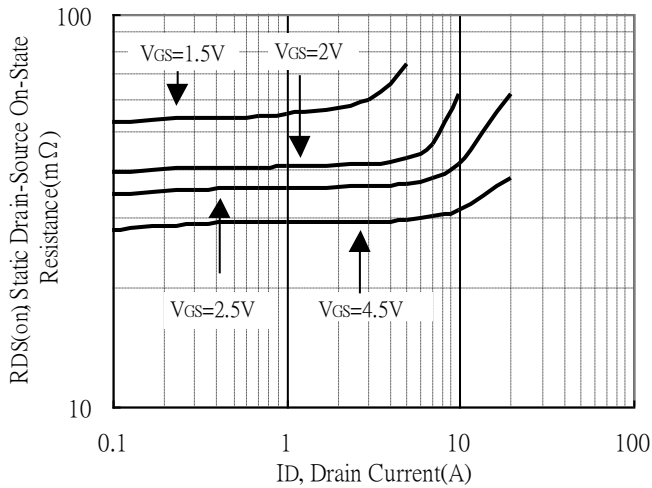
Typical Output Characteristics



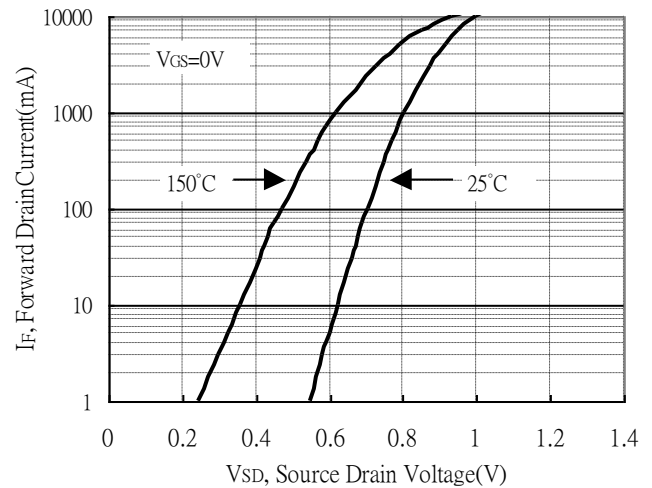
Static Drain-Source On-resistance vs Ambient Temperature



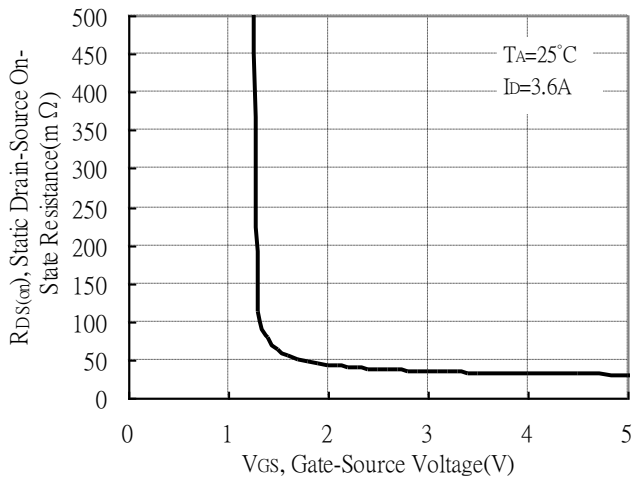
Static Drain-Source On-State resistance vs Drain Current



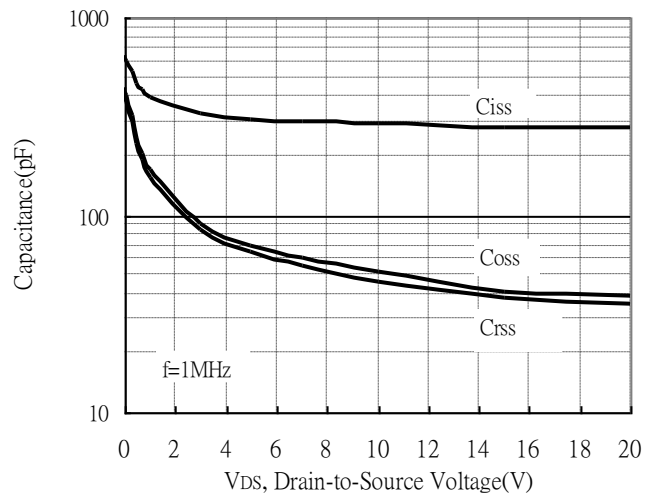
Forward Drain Current vs Source-Drain Voltage



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

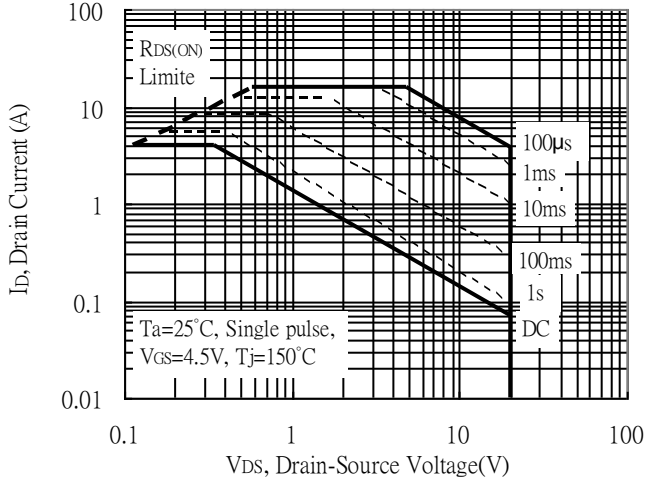


Capacitance vs Reverse Voltage

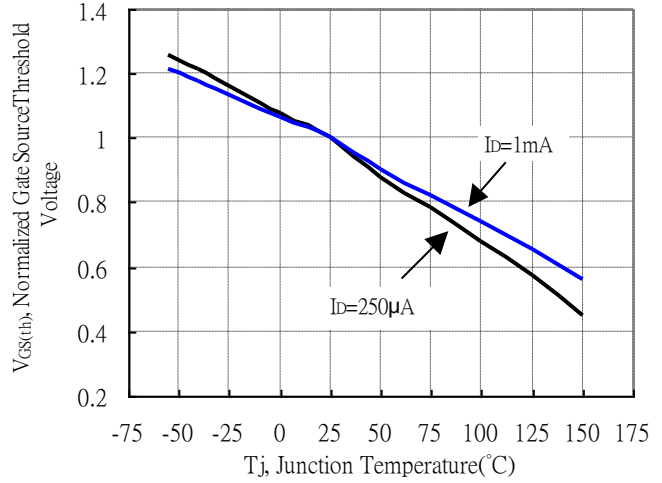


Typical Characteristics(Cont.)

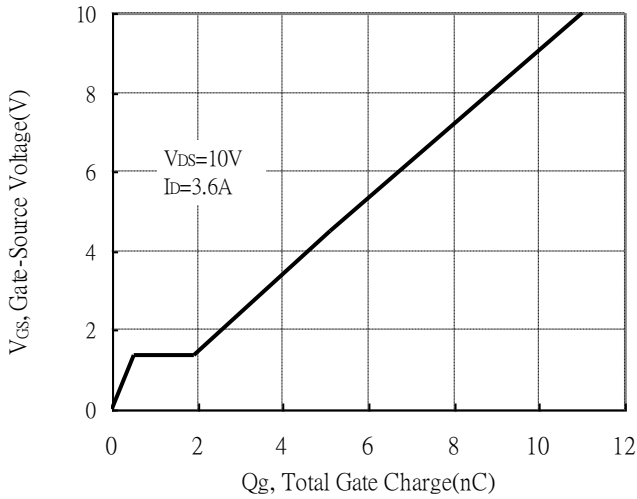
Maximum Safe Operating Area



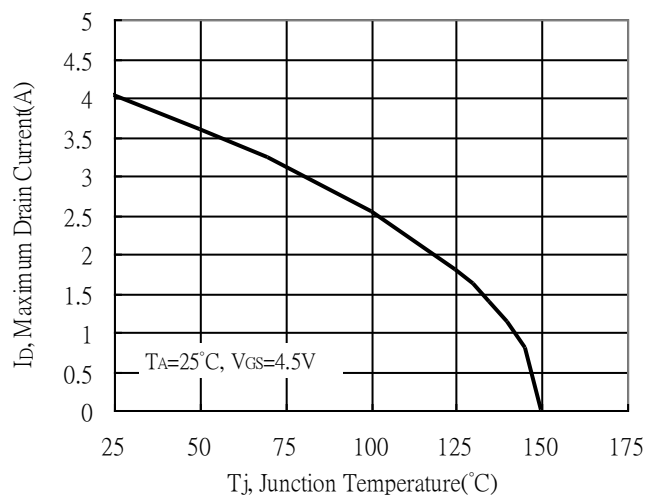
Gate Threshold Voltage vs Ambient Temperature



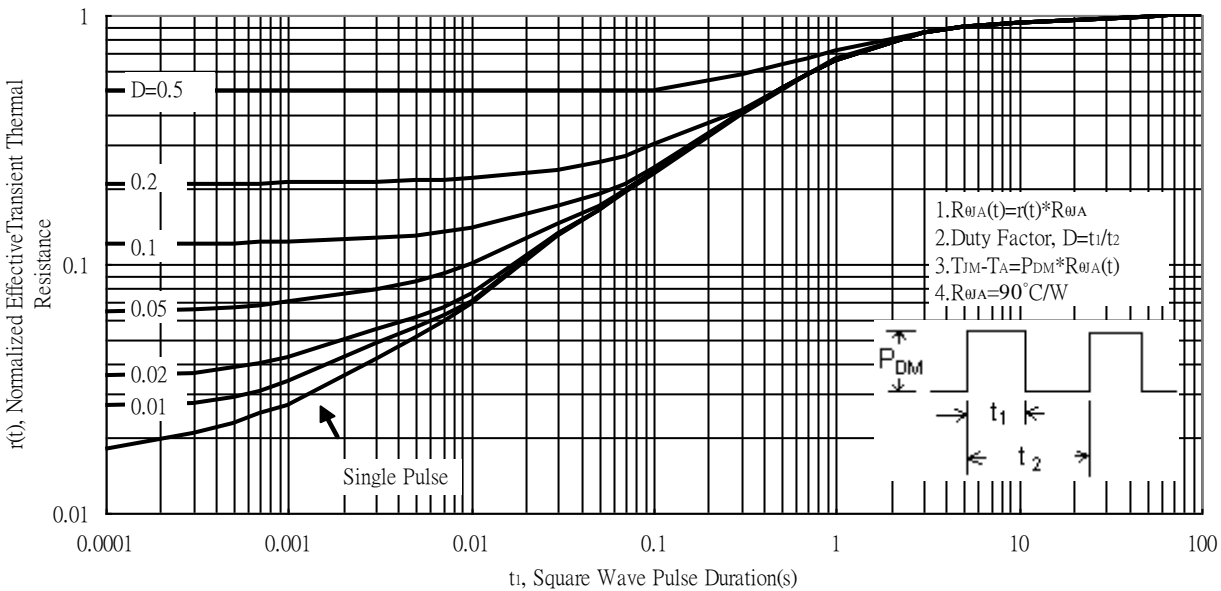
Gate Charge Characteristics



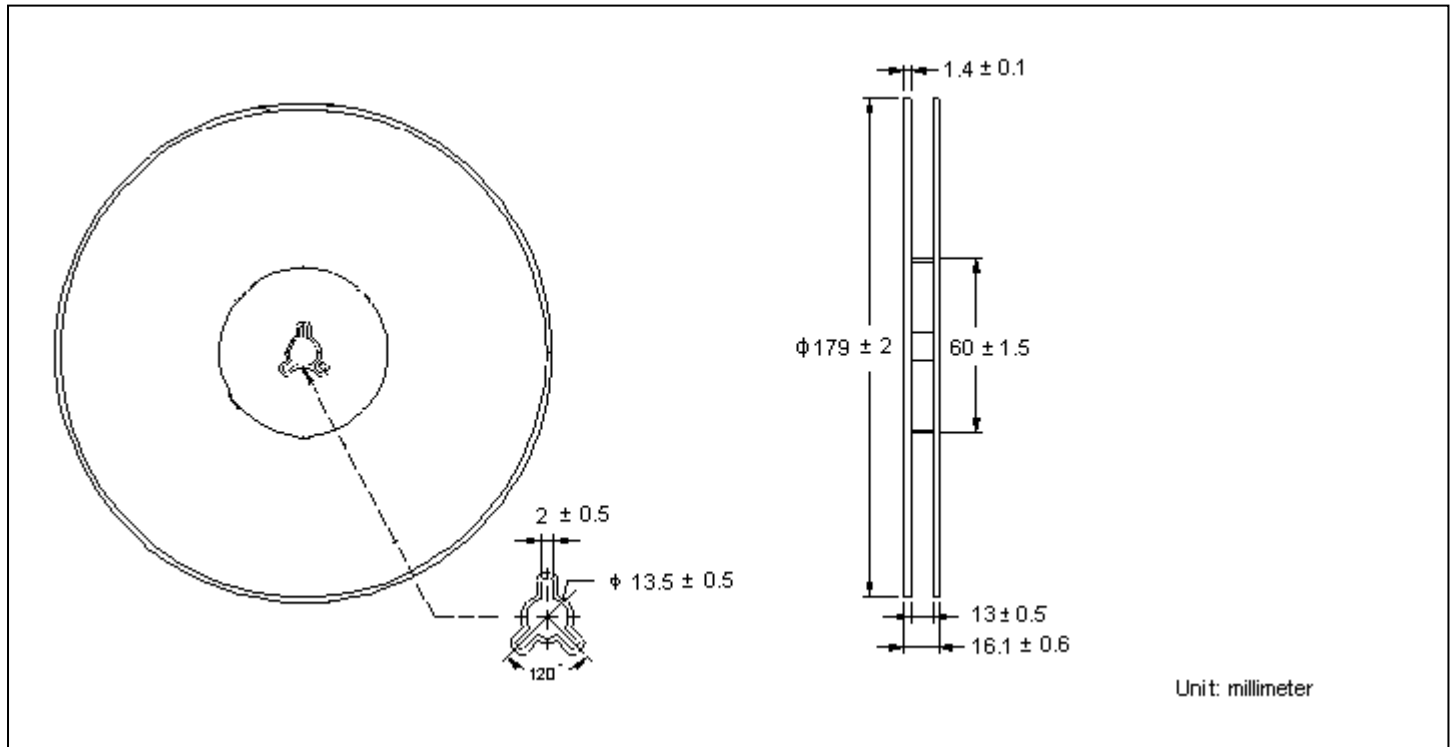
Maximum Drain Current vs Junction Temperature



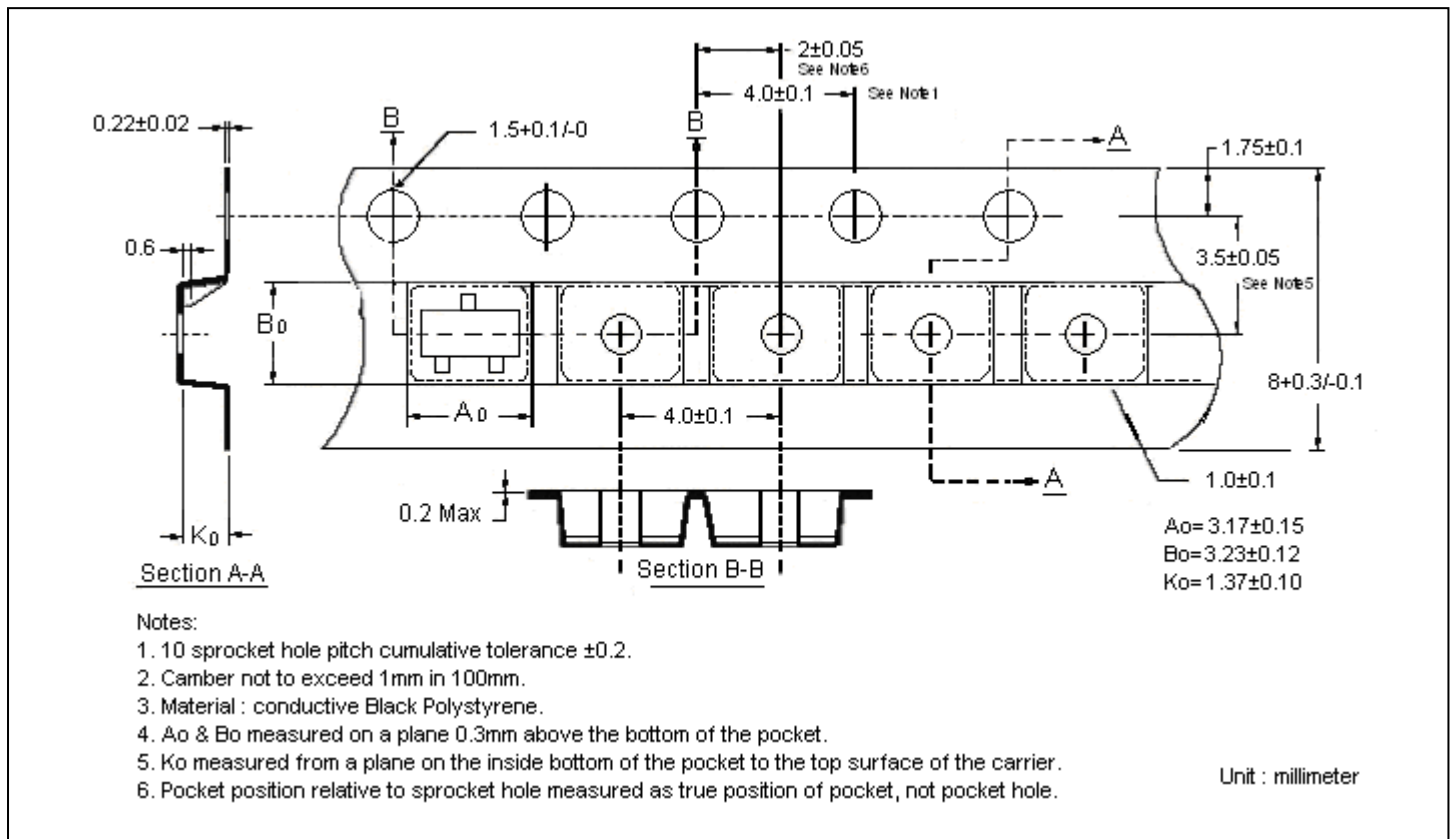
Transient Thermal Response Curves



Reel Dimension



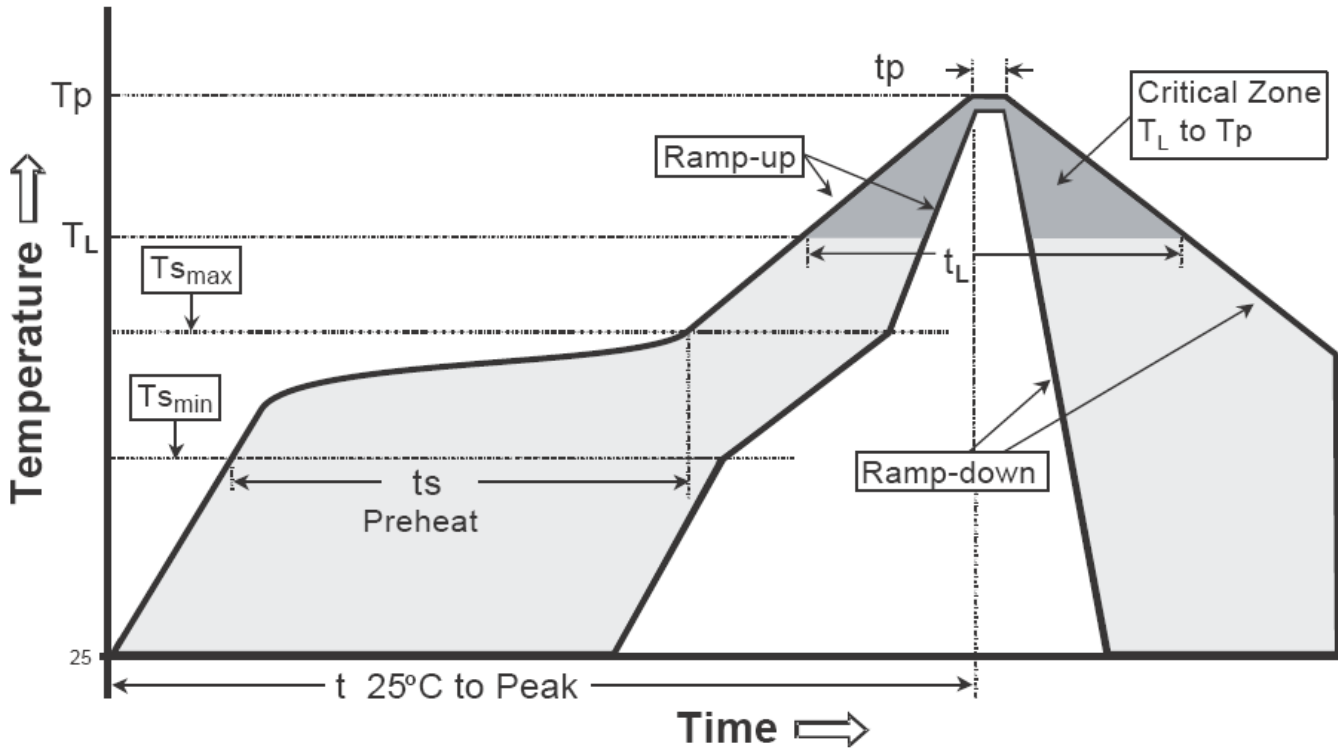
Carrier Tape Dimension



Recommended wave soldering condition

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

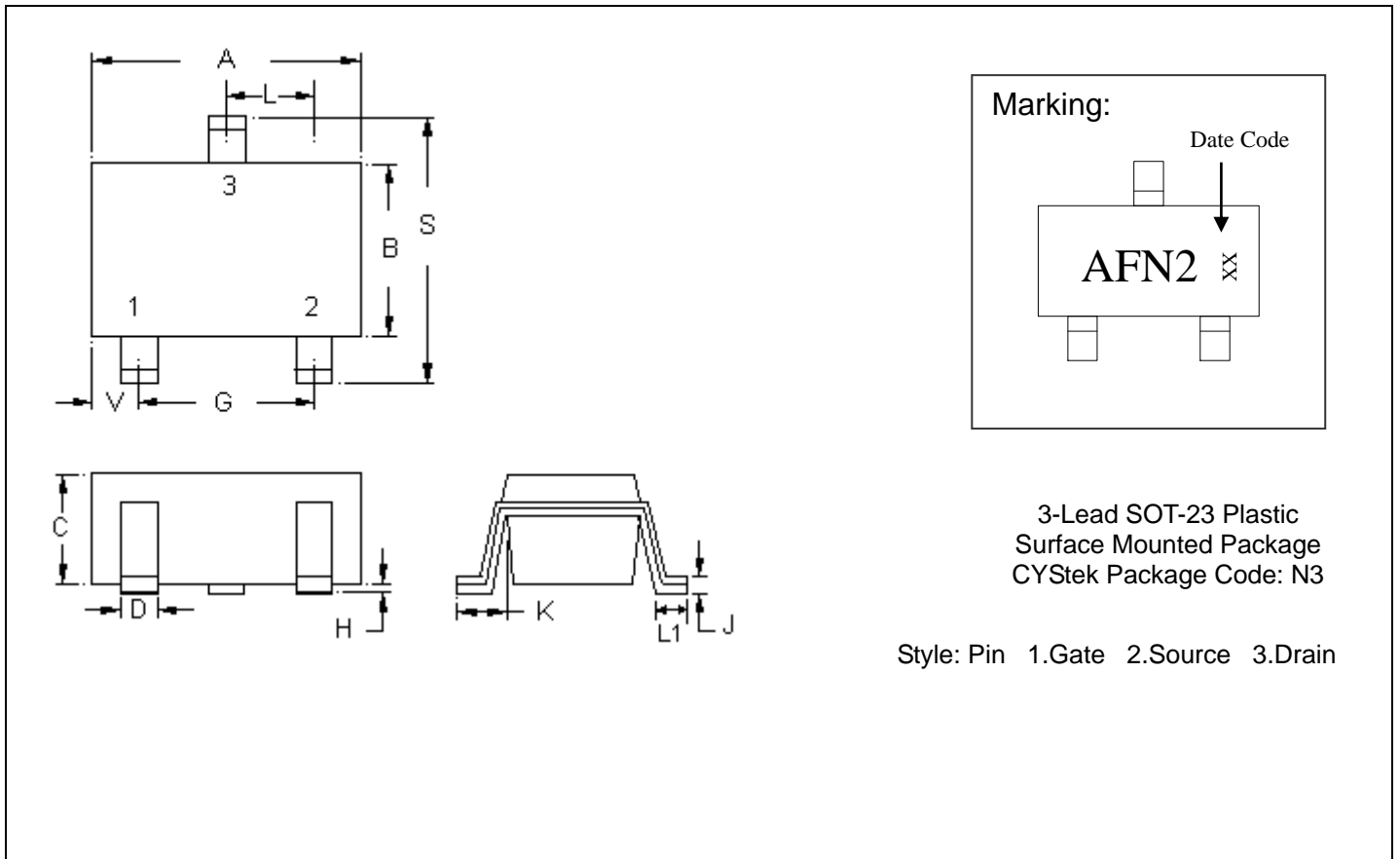
Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T _{smax} to T _p)	3°C/second max.	3°C/second max.
Preheat -Temperature Min(T _{s min}) -Temperature Max(T _{s max}) -Time(t _{s min} to t _{s max})	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
Time maintained above: -Temperature (T _L) - Time (t _L)	183°C 60-150 seconds	217°C 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.

SOT-23 Dimension



DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1102	0.1204	2.80	3.04	J	0.0032	0.0079	0.08	0.20
B	0.0472	0.0669	1.20	1.70	K	0.0118	0.0266	0.30	0.67
C	0.0335	0.0512	0.89	1.30	L	0.0335	0.0453	0.85	1.15
D	0.0118	0.0197	0.30	0.50	S	0.0830	0.1161	2.10	2.95
G	0.0669	0.0910	1.70	2.30	V	0.0098	0.0256	0.25	0.65
H	0.0000	0.0040	0.00	0.10	L1	0.0118	0.0197	0.30	0.50

- 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.

Important Notice:

- All rights are reserved. Reproduction in whole or in part is prohibited without the prior written approval of CYStek.
- CYStek reserves the right to make changes to its products without notice.
- CYStek **semiconductor products are not warranted to be suitable for use in Life-Support Applications, or systems.**
- CYStek assumes no liability for any consequence of customer product design, infringement of patents, or application assistance.