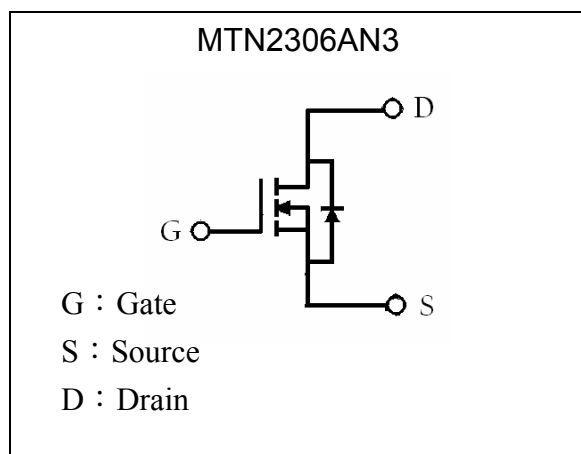
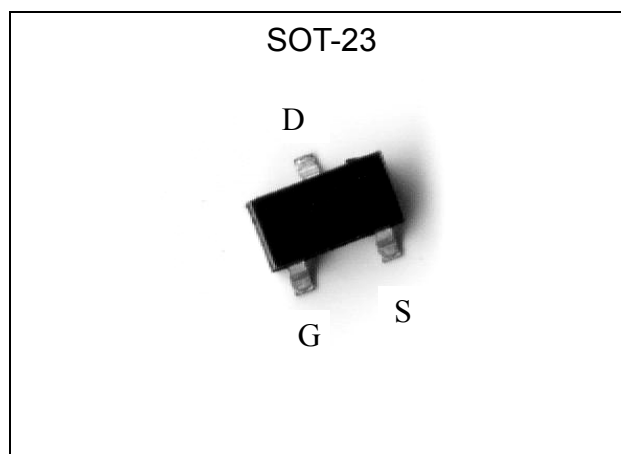


**30V N-CHANNEL Enhancement Mode MOSFET**

# MTN2306AN3

**Features**

- $V_{DS}=30V$   
 $R_{DS(ON)}=35m\Omega @ V_{GS}=4.5V, I_D=5A$   
 $R_{DS(ON)}=50m\Omega @ V_{GS}=2.5V, I_D=2.6A$
- Low on-resistance
- Low gate charge
- Excellent thermal and electrical capabilities
- Pb-free package

**Equivalent Circuit**

**Outline**

**Absolute Maximum Ratings** ( $T_a=25^{\circ}C$ )

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Continuous Drain Current @ $T_A=25^{\circ}C, V_{GS}=4.5V$ (Note 3)	$I_D$	5	A
Continuous Drain Current @ $T_A=70^{\circ}C, V_{GS}=4.5V$ (Note 3)	$I_D$	4	A
Pulsed Drain Current (Note 1, 2)	$I_{DM}$	20	A
Maximum Power Dissipation @ $T_A=25^{\circ}C$	$P_D$	1.38	W
Linear Derating Factor		0.01	W/ $^{\circ}C$
Thermal Resistance, Junction-to-Ambient (Note 3)	$R_{th,ja}$	90	$^{\circ}C/W$
Operating Junction and Storage Temperature	$T_j, T_{stg}$	-55~+150	$^{\circ}C$

Note : 1. Pulse width limited by maximum junction temperature.

 2. Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .

 3. Surface mounted on 1 in<sup>2</sup> copper pad of FR-4 board; 270 $^{\circ}C/W$  when mounted on minimum copper pad.



**Electrical Characteristics** (T<sub>j</sub>=25°C, unless otherwise specified)

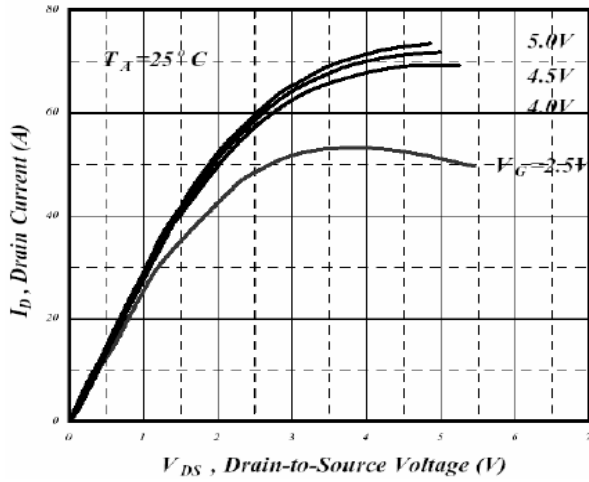
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
BV <sub>DSS</sub>	30	-	-	V	V <sub>GS</sub> =0, I <sub>D</sub> =250μA
BV <sub>DSS</sub> /ΔT <sub>j</sub>	-	0.1	-	V/°C	Reference to 25°C, I <sub>D</sub> =1mA
V <sub>GS(th)</sub>	0.5	-	1.2	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA
G <sub>FS</sub>	-	13	-	S	V <sub>DS</sub> =5V, I <sub>D</sub> =5A
I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0
I <sub>DSS</sub>	-	-	1	μA	V <sub>DS</sub> =30V, V <sub>GS</sub> =0
	-	-	25	μA	V <sub>DS</sub> =24V, V <sub>GS</sub> =0, T <sub>j</sub> =70°C
*R <sub>Ds(ON)</sub>	-	-	30	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =5A
	-	-	35		V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A
	-	-	50		V <sub>GS</sub> =2.5V, I <sub>D</sub> =2.6A
	-	-	110		V <sub>GS</sub> =1.8V, I <sub>D</sub> =1A
<b>Dynamic</b>					
C <sub>iss</sub>	-	660	1050	pF	V <sub>DS</sub> =25V, V <sub>GS</sub> =0, f=1MHz
C <sub>oss</sub>	-	90	-		
C <sub>rss</sub>	-	70	-		
*t <sub>d(ON)</sub>	-	6	-	ns	V <sub>DS</sub> =15V, I <sub>D</sub> =5A, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3Ω, R <sub>D</sub> =3Ω
*t <sub>r</sub>	-	20	-		
*t <sub>d(OFF)</sub>	-	20	-		
*t <sub>f</sub>	-	3	-		
*Q <sub>g</sub>	-	8.5	15	nC	V <sub>DS</sub> =16V, I <sub>D</sub> =5A, V <sub>GS</sub> =4.5V
*Q <sub>gs</sub>	-	1.5	-		
*Q <sub>gd</sub>	-	3.2	-		
<b>Source-Drain Diode</b>					
*V <sub>SD</sub>	-	-	1.2	V	V <sub>GS</sub> =0V, I <sub>S</sub> =1.2A
*t <sub>rr</sub>	-	14	-	ns	I <sub>S</sub> =5A, V <sub>GS</sub> =0V, dI/dt=100A/μs
*Q <sub>rr</sub>	-	7	-	nC	

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

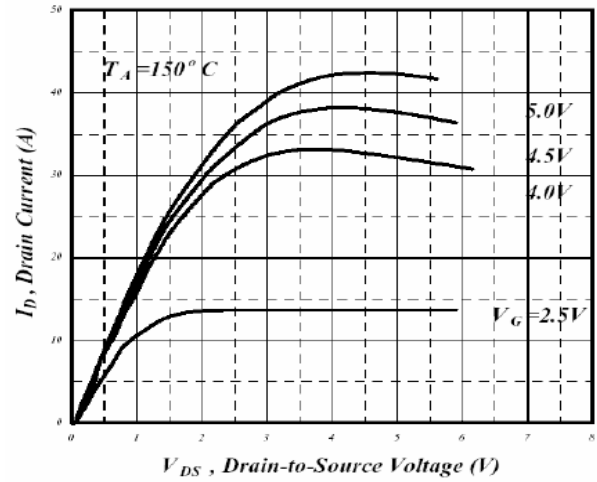
**Ordering Information**

Device	Package	Shipping	Marking
MTN2306AN3	SOT-23 (Pb-free)	3000 pcs / Tape & Reel	2306A

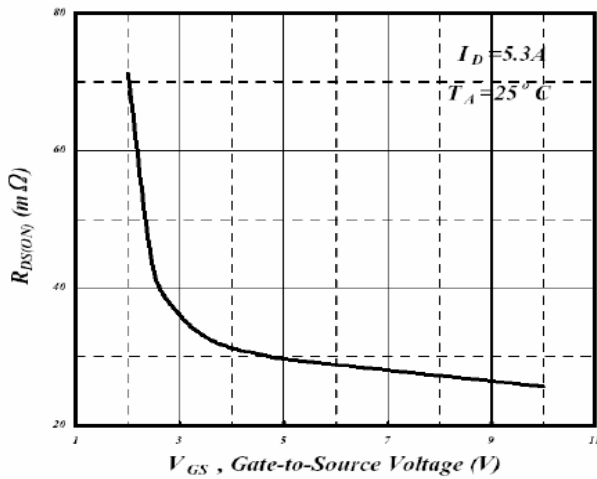
**Characteristic Curves**



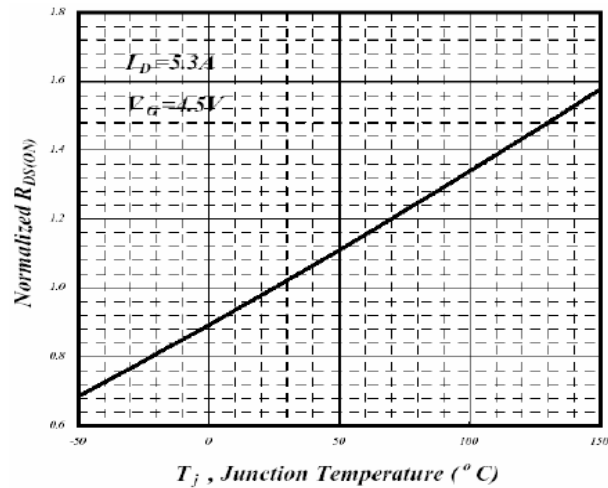
**Fig 1. Typical Output Characteristics**



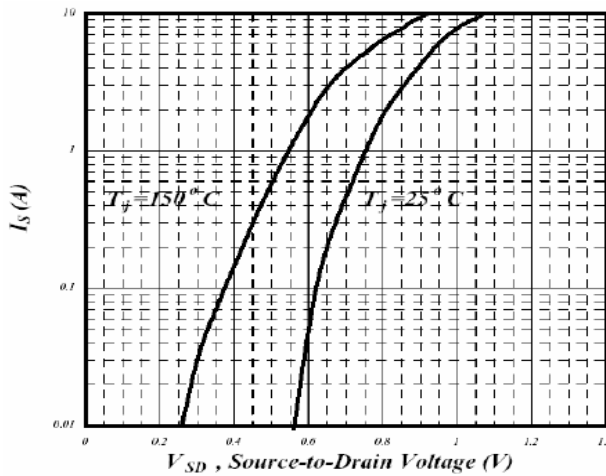
**Fig 2. Typical Output Characteristics**



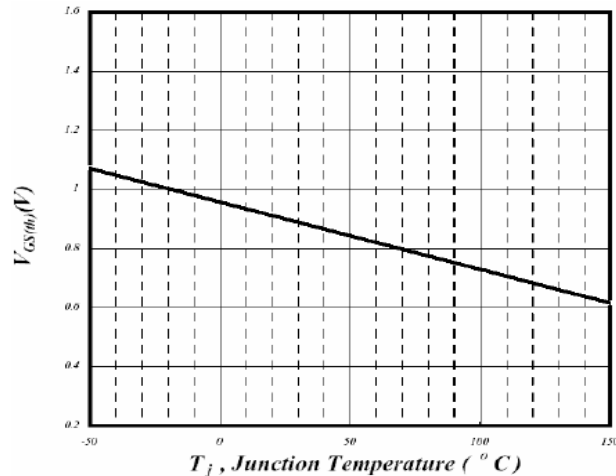
**Fig 3. On-Resistance v.s. Gate Voltage**



**Fig 4. Normalized On-Resistance v.s. Junction Temperature**

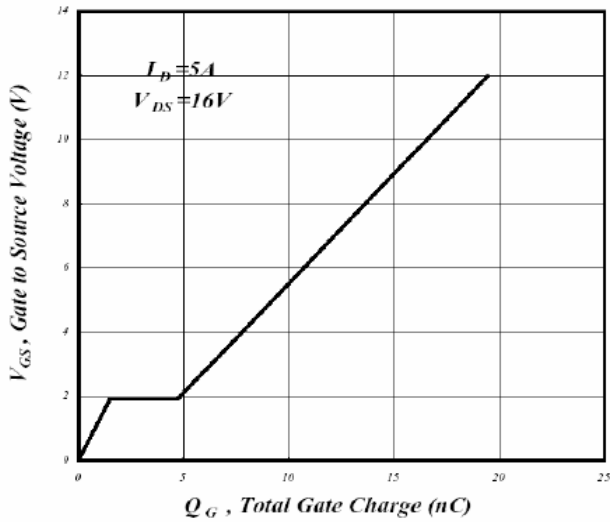


**Fig 5. Forward Characteristics of Reverse Diode**

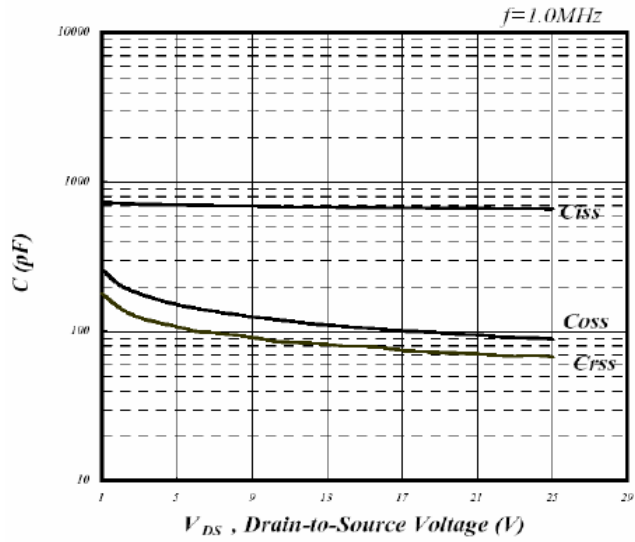


**Fig 6. Gate Threshold Voltage v.s. Junction Temperature**

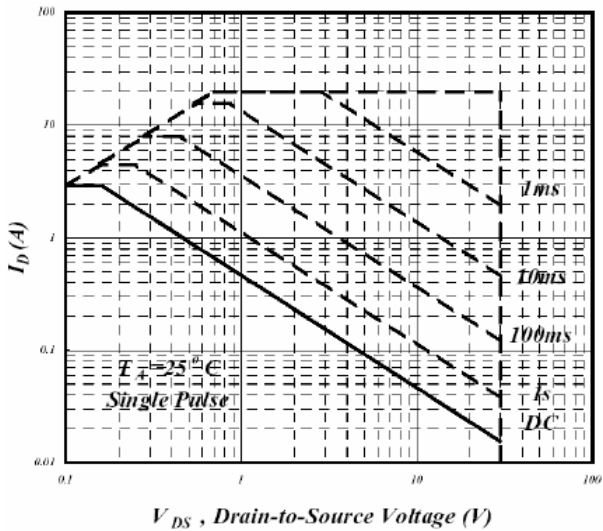
**Characteristic Curves(Cont.)**



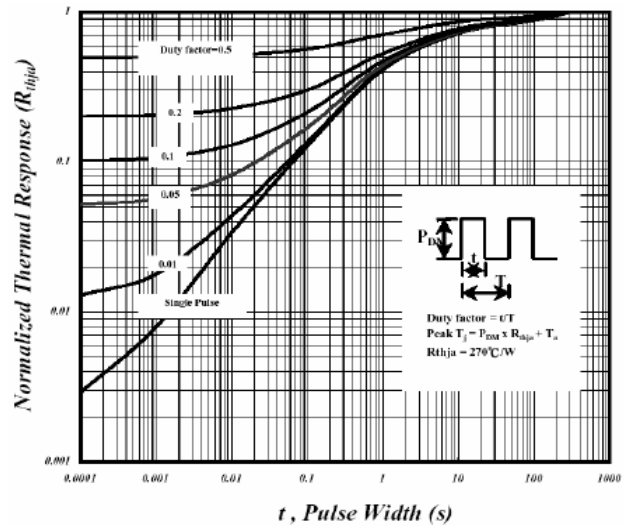
**Fig 7. Gate Charge Characteristics**



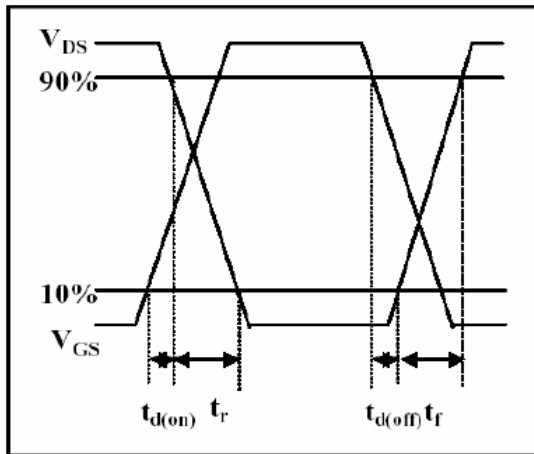
**Fig 8. Typical Capacitance Characteristics**



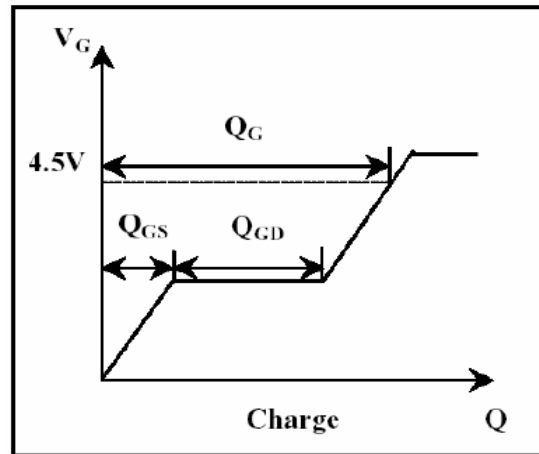
**Fig 9. Maximum Safe Operating Area**



**Fig 10. Effective Transient Thermal Impedance**

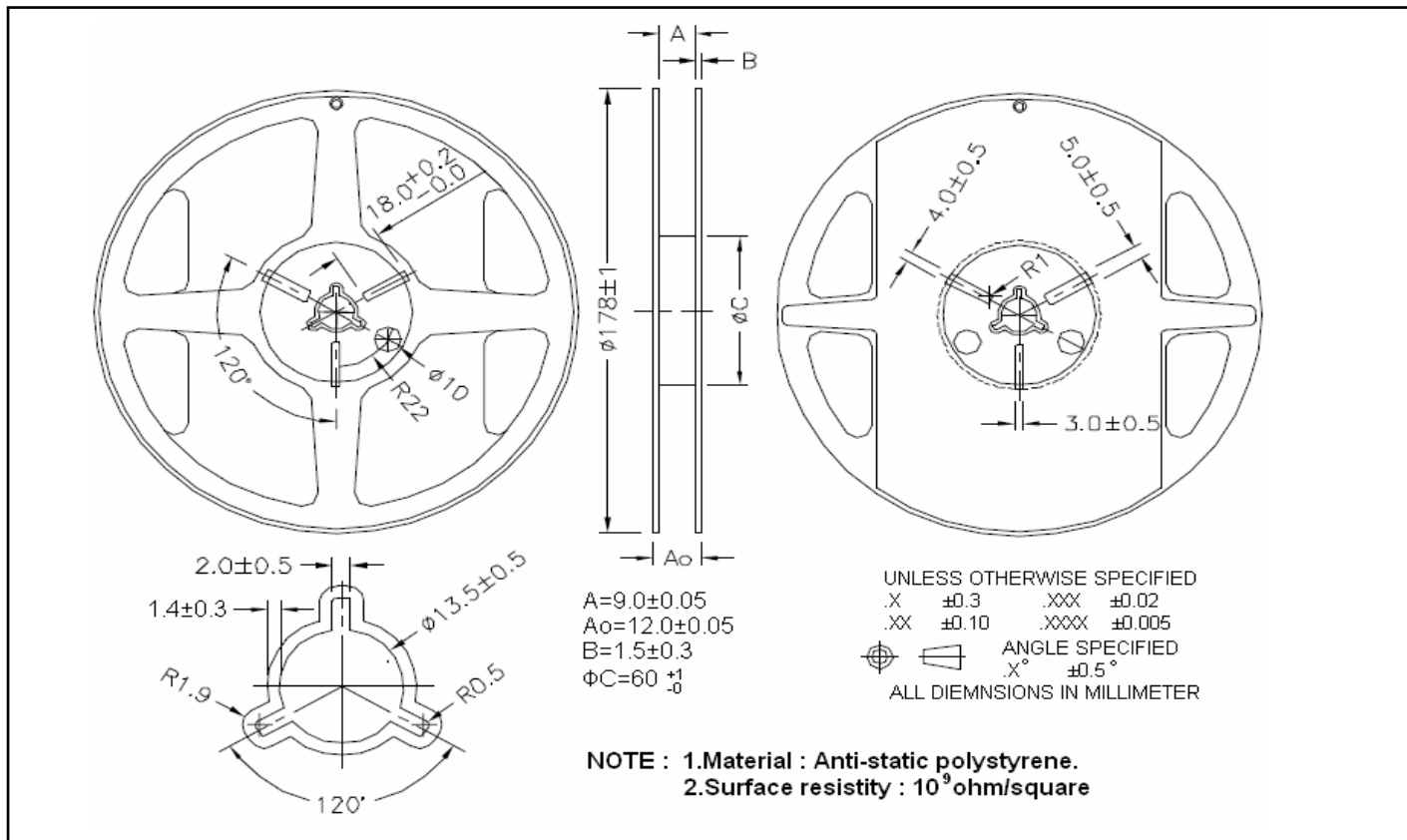


**Fig 11. Switching Time Waveform**

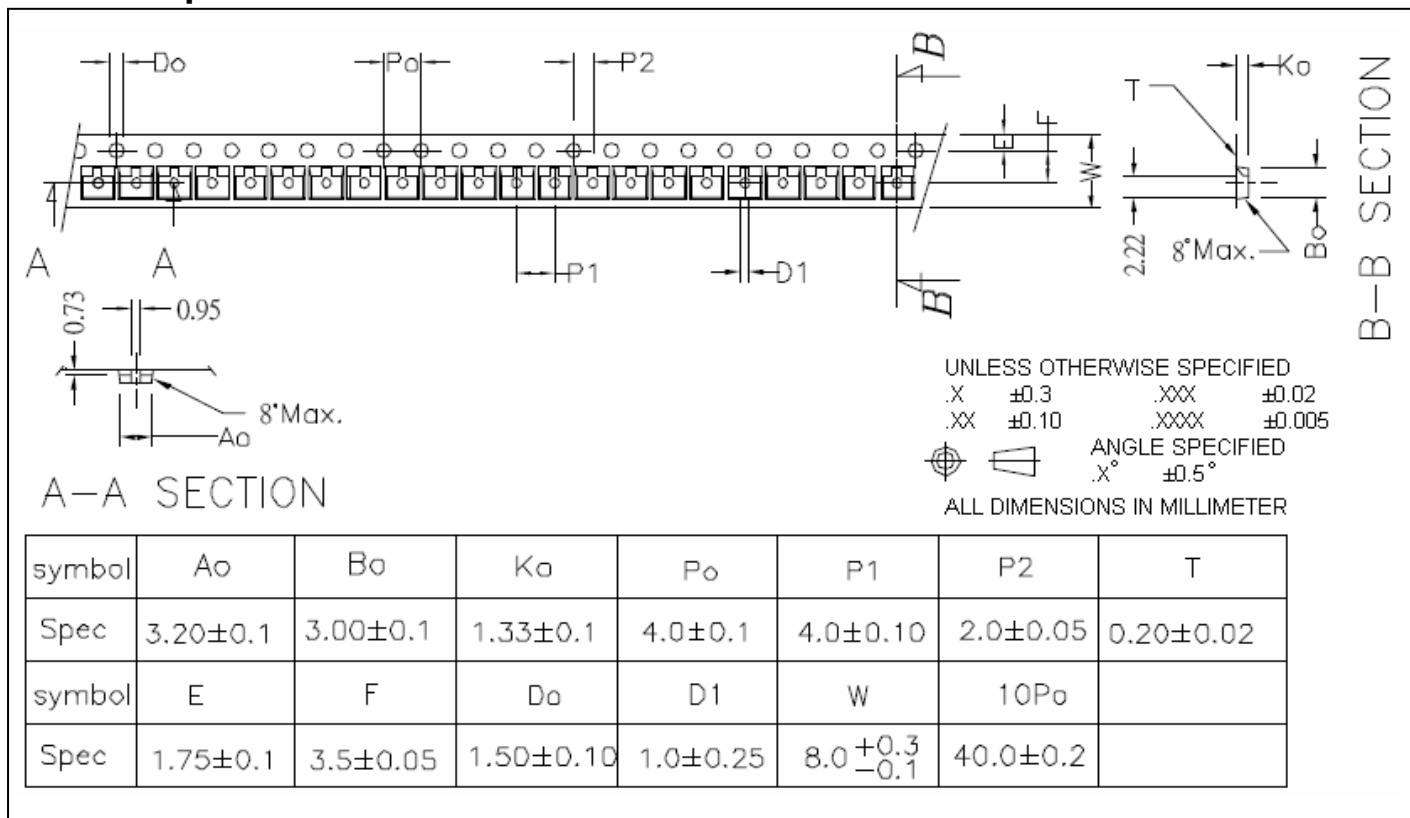


**Fig 12. Gate Charge Waveform**

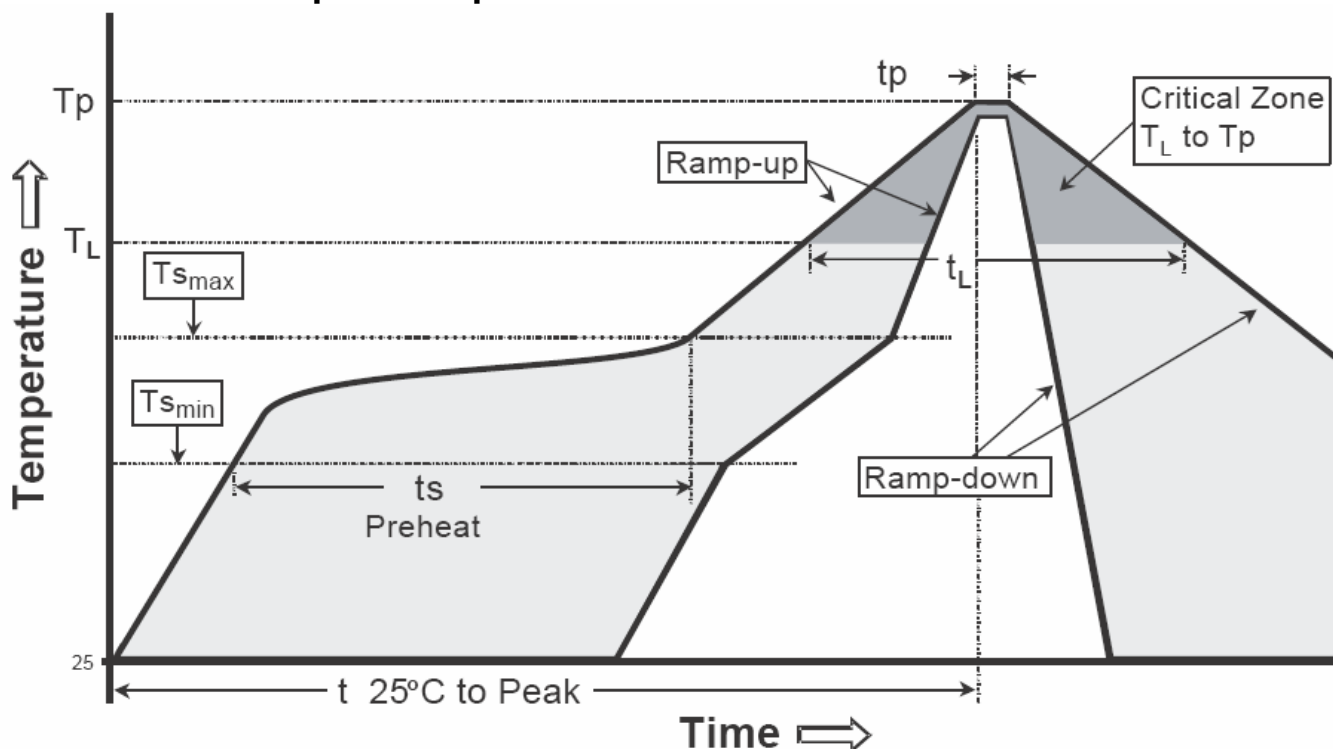
**Reel Dimension**



**Carrier Tape Dimension**



**Recommended temperature profile for IR reflow**



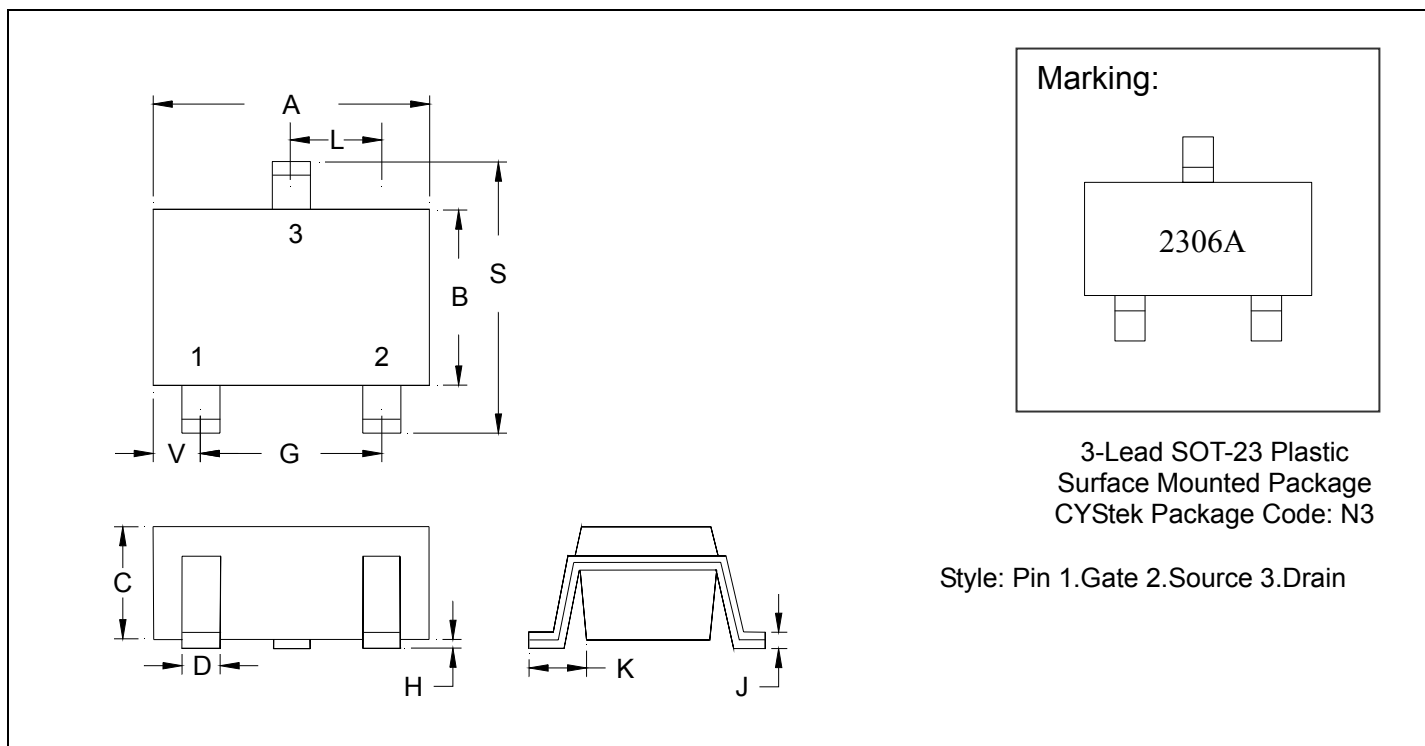
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T <sub>smax</sub> to T <sub>p</sub> )	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T <sub>s min</sub> )	100°C	150°C
-Temperature Max(T <sub>s max</sub> )	150°C	200°C
-Time(t <sub>s min</sub> to t <sub>s max</sub> )	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.

**Recommended wave soldering condition**

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

## SOT-23 Dimension



\*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1102	0.1204	2.80	3.04	J	0.0034	0.0070	0.085	0.177
B	0.0472	0.0630	1.20	1.60	K	0.0128	0.0266	0.32	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	0.1083	2.10	2.75
G	0.0669	0.0910	1.70	2.30	V	0.0098	0.0256	0.25	0.65
H	0.0005	0.0040	0.013	0.10					

**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: 42 Alloy ; tin plating
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

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