P-Channel Enhancement Mode Power MOSFET

MTP452L3

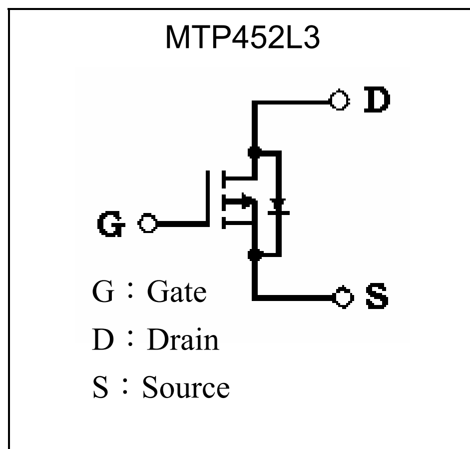
BV_{DSS}	-30V
$R_{DSON(MAX)}$	55mΩ
I_D	-6A

Features

- Simple Drive Requirement
- Low On-resistance
- Fast switching Characteristic
- Pb-free lead plating package

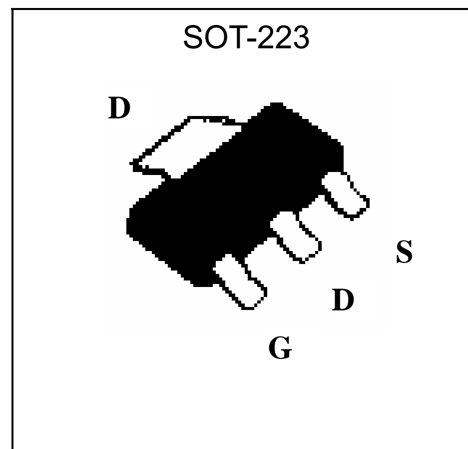
Symbol

MTP452L3



Outline

SOT-223



Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current @ T_A=25°C	I_D	-6.0 *1	A
Continuous Drain Current @ T_A=70°C	I_D	-4.8 *1	A
Pulsed Drain Current	I_{DM}	-20 *1	A
Total Power Dissipation (T_A=25℃)	Pd	2.7	W
Linear Derating Factor		0.02	W/°C
Operating Junction and Storage Temperature	Tj, Tstg	-55~+150	°C
Thermal Resistance, Junction-to-ambient, max	$R_{th,j-a}$	45 *2	°C/W

Note : *1. Pulse width limited by maximum junction temperature
*2. Surface mounted on 1 in^2 copper pad of FR-4 board; 120°C/W when mounted on minimum copper pad

Characteristics (Tj=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	-30	-	-	V	V_{GS}=0, I_D=-250μA
$\Delta BV_{DSS}/\Delta Tj$	-	-0.02	-	V/°C	Reference to 25°C, I_D=-1mA
$V_{GS(th)}$	-1.0	-	-3.0	V	V_{DS} = V_{GS}, I_D=-250μA
G_{FS}	-	10	-	S	V_{DS} =-10V, I_D=-5.3A
I_{GSS}	-	-	±100	nA	V_{GS}=±20
I_{DSS}	-	-	-1	μA	V_{DS} =-30V, V_{GS} =0
I_{DSS}	-	-	-25	μA	V_{DS} =-24V, V_{GS} =0, Tj=70°C
*$R_{DS(ON)}$	-	45	55	mΩ	V_{GS} =-10V, I_D=-5.3A
*$R_{DS(ON)}$	-	75	100	mΩ	V_{GS} =-4.5V, I_D=-4.2A
Dynamic					
*Qg	-	9.2	16	nC	I_D=-5.3A, V_{DS}=-24V, V_{GS}=-4.5V
*Qgs	-	2.8	-		
*Qgd	-	5.2	-		
*$t_{d(ON)}$	-	11	-	ns	V_{DS}=-15V, I_D=-1A,V_{GS}=-10V, R_G=6Ω, R_D=15Ω
*tr	-	8	-		
*$t_{d(OFF)}$	-	25	-		
*t_f	-	17	-		
Ciss	-	507	912	pF	V_{GS}=0V, V_{DS}=-15V, f=1MHz
Coss	-	222	-		
Crss	-	158	-		
Source-Drain Diode					
*V_{SD}	-	-	-1.2	V	I_S=-2.3A, V_{GS}=0V
*trr	-	29	-	ns	I_S=-5.3A, V_{GS}=0, dI/dt=100A/μs
*Qrr	-	20	-	nC	

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

Ordering Information

Device	Package	Shipping	Marking
MTP452L3	SOT-223 (Pb-free lead plating package)	2500 pcs / Tape & Reel	452

Typical Characteristics

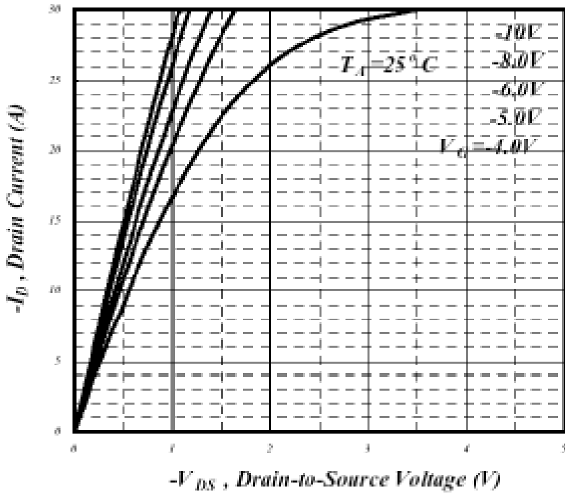


Fig 1. Typical Output Characteristics

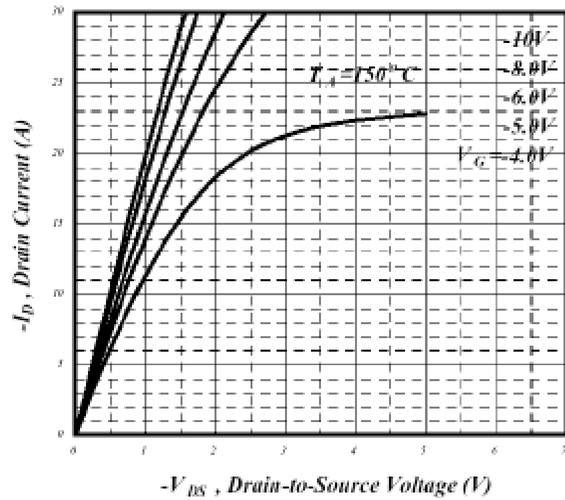


Fig 2. Typical Output Characteristics

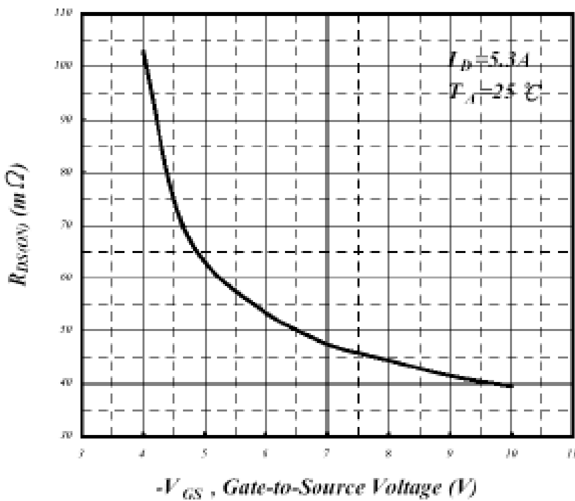


Fig 3. On-Resistance v.s. Gate Voltage

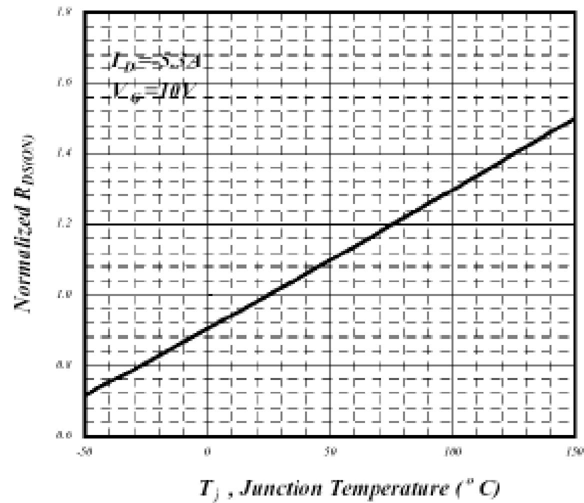


Fig 4. Normalized On-Resistance v.s. Junction Temperature

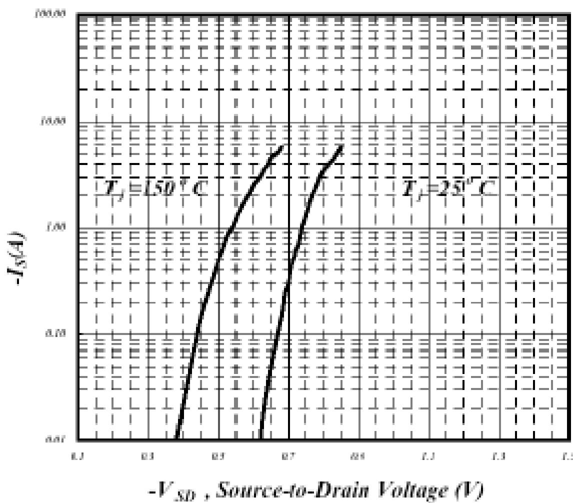


Fig 5. Forward Characteristics of Reverse Diode

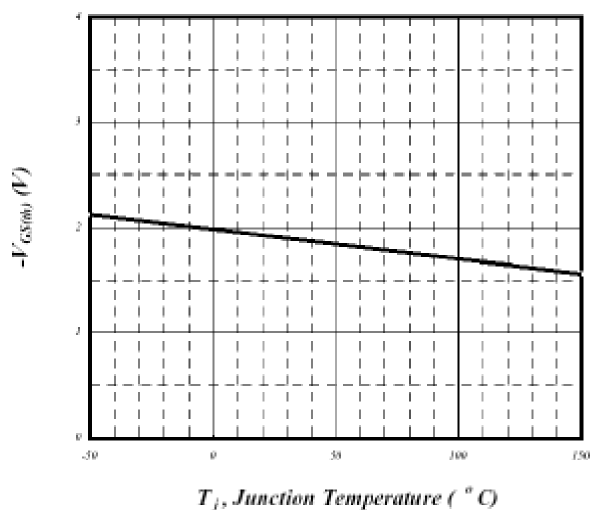


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

Typical Characteristics(Cont.)

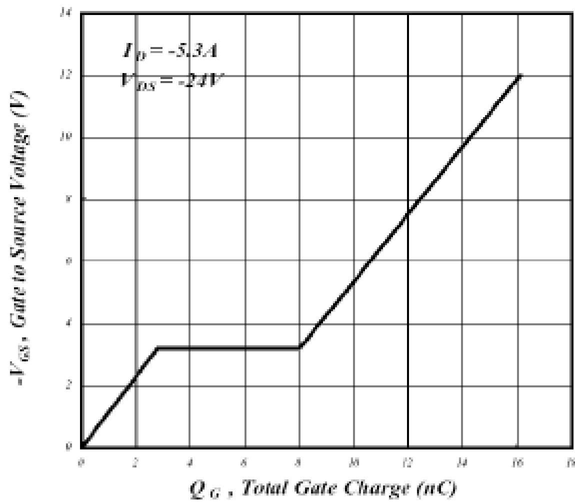


Fig 7. Gate Charge Characteristics

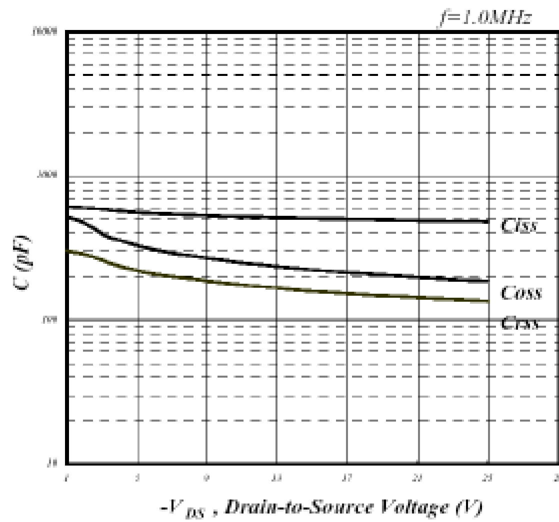


Fig 8. Typical Capacitance Characteristics

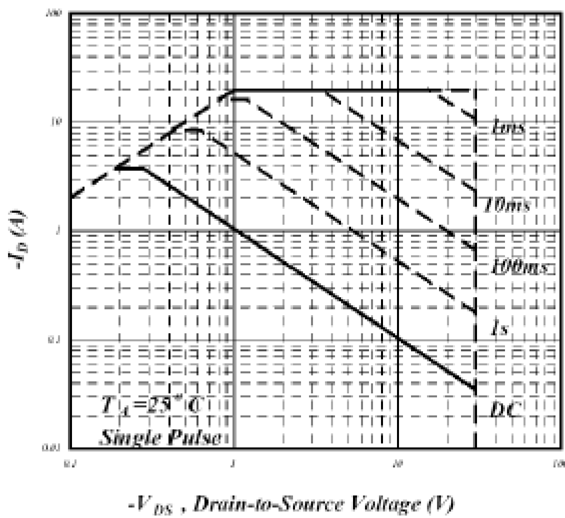


Fig 9. Maximum Safe Operating Area

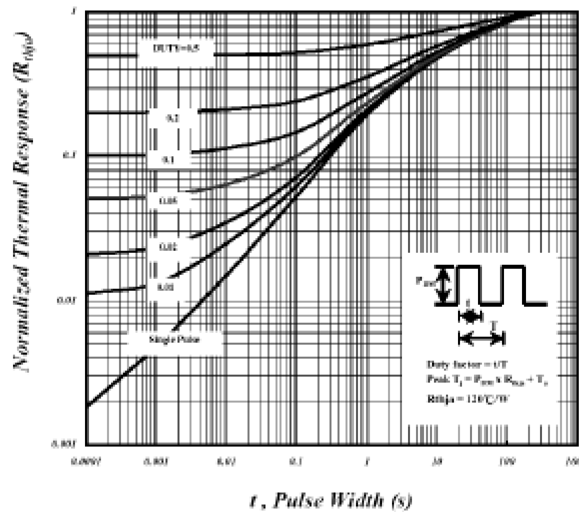


Fig 10. Effective Transient Thermal Impedance

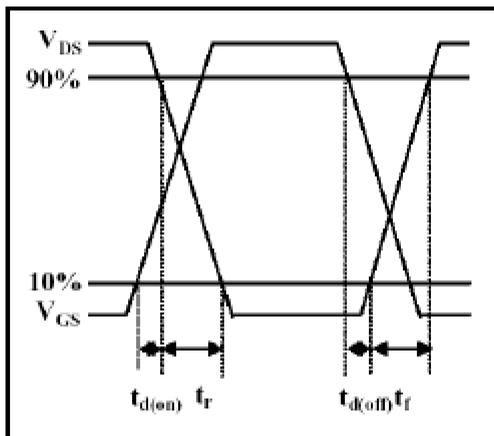


Fig 11. Switching Time Circuit

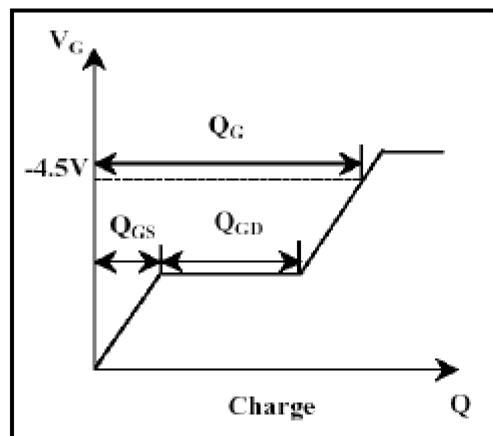
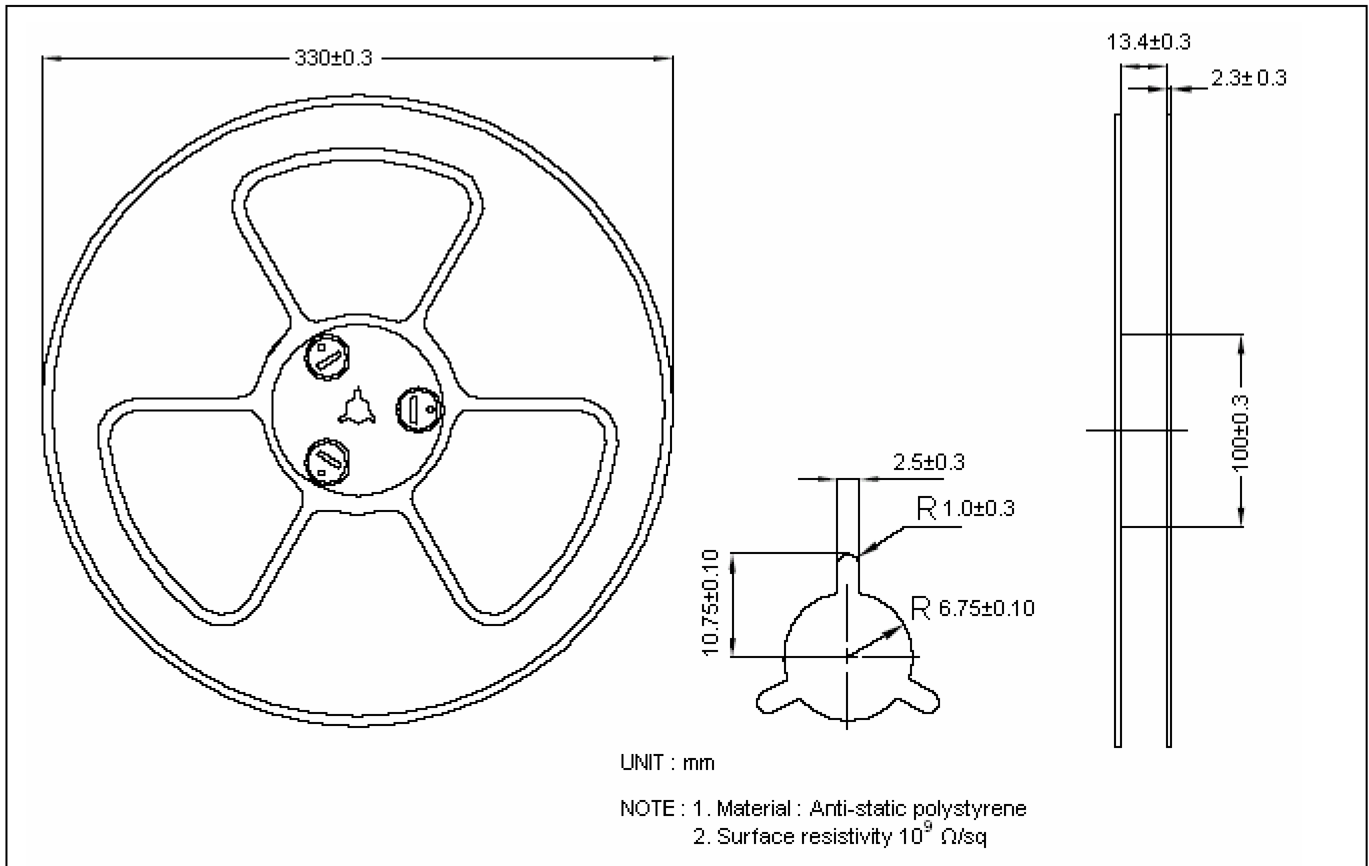
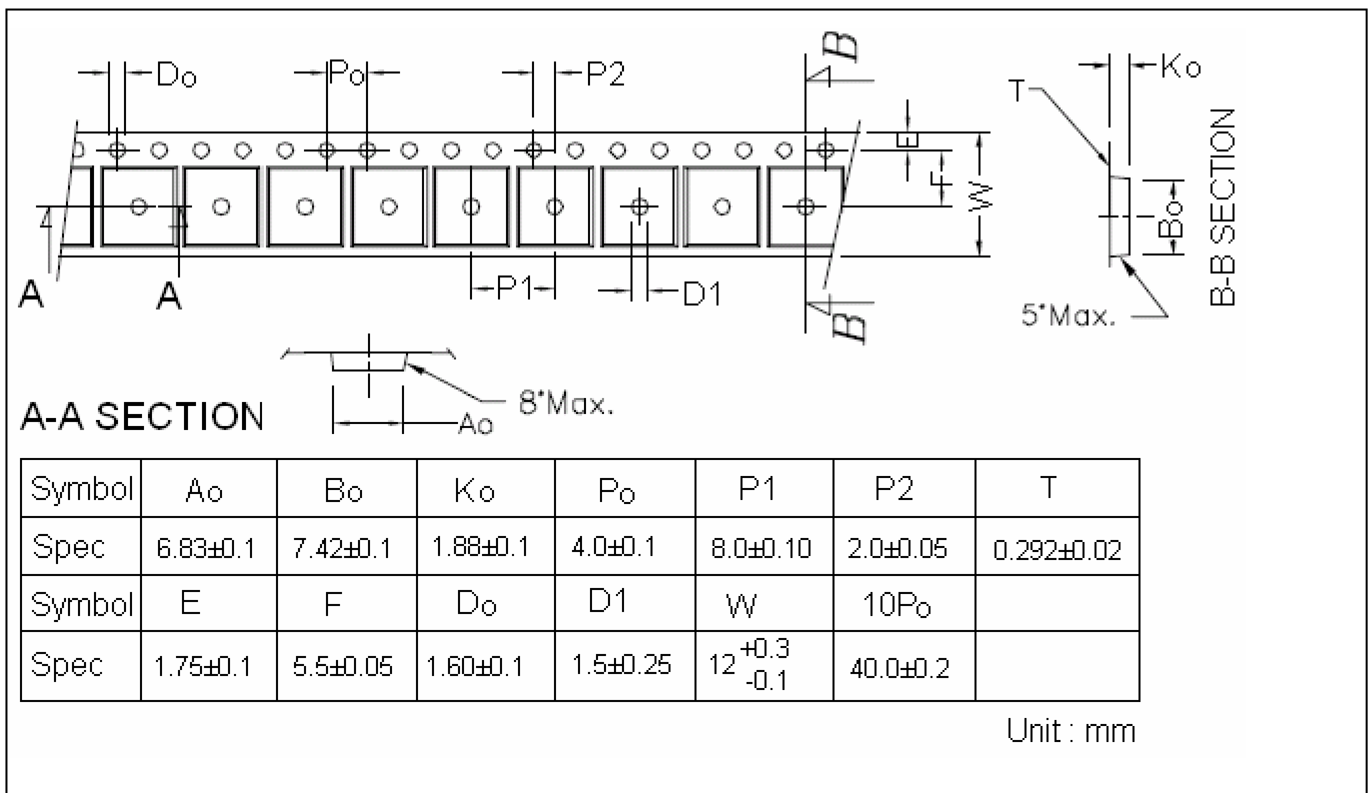


Fig 12. Gate Charge Waveform

Reel Dimension



Carrier Tape Dimension



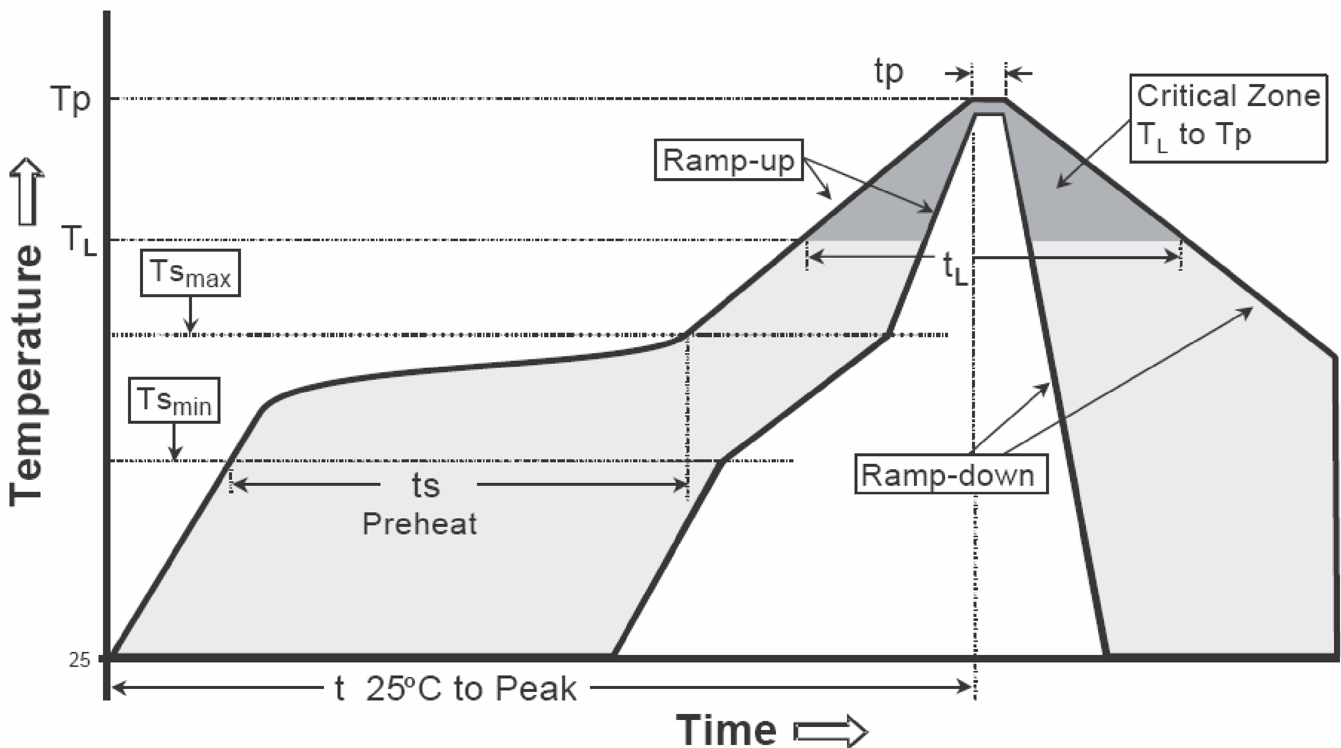
Symbol	Ao	Bo	Ko	Po	P1	P2	T
Spec	6.83±0.1	7.42±0.1	1.88±0.1	4.0±0.1	8.0±0.10	2.0±0.05	0.292±0.02
Symbol	E	F	Do	D1	W	10Po	
Spec	1.75±0.1	5.5±0.05	1.60±0.1	1.5±0.25	$12^{+0.3}_{-0.1}$	40.0±0.2	

Unit : mm

Recommended wave soldering condition

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

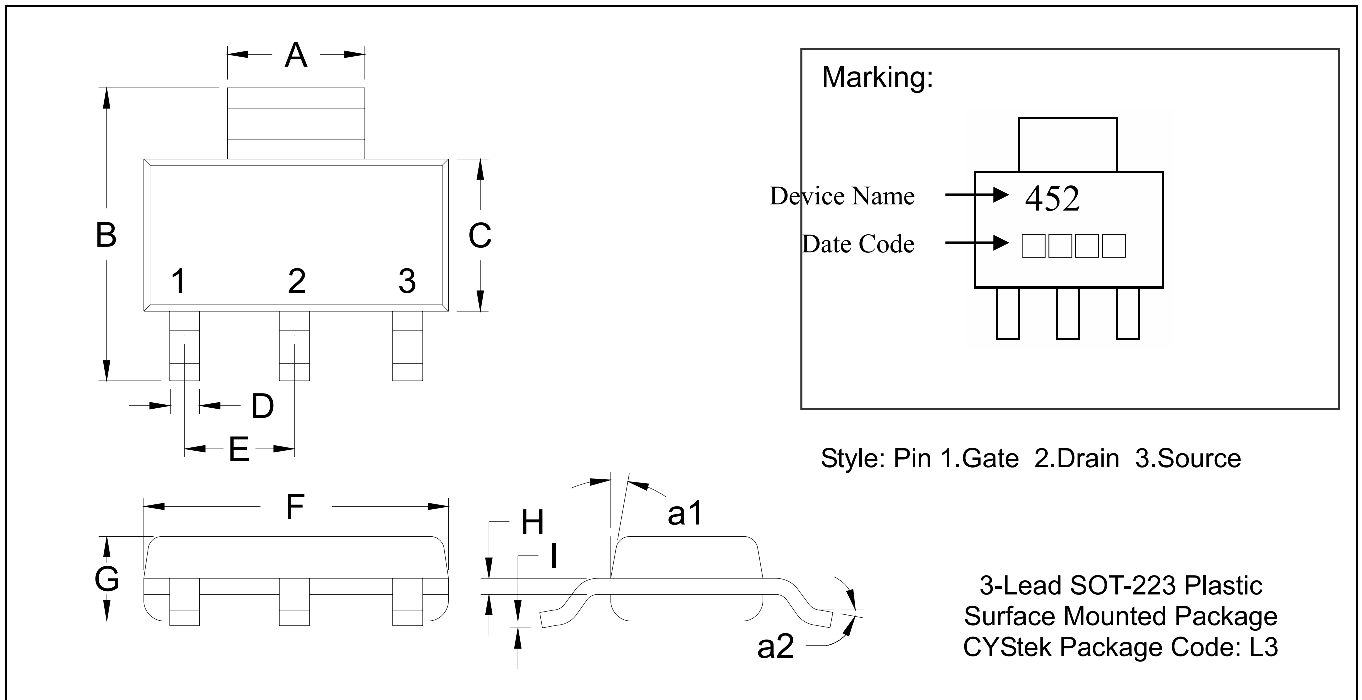
Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time(ts_{min} to ts_{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-223 Dimension



*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1142	0.1220	2.90	3.10	G	0.0551	0.0709	1.40	1.80
B	0.2638	0.2874	6.70	7.30	H	0.0098	0.0138	0.25	0.35
C	0.1299	0.1457	3.30	3.70	I	0.0008	0.0039	0.02	0.10
D	0.0236	0.0315	0.60	0.80	a1	*13°	-	*13°	-
E	*0.0906	-	*2.30	-	a2	0°	10°	0°	10°
F	0.2480	0.2638	6.30	6.70					

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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