30V N-CHANNEL Enhancement Mode MOSFET

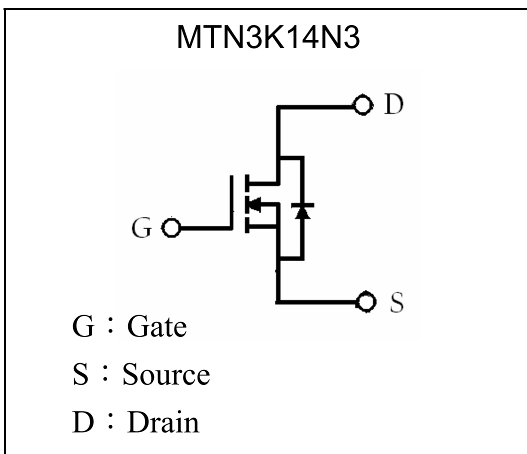
MTN3K14N3

Features

- V_{DS}=30V
  $R_{DS(ON)}$=39mΩ@V_{GS}=10V, I_D=2A
  $R_{DS(ON)}$=57mΩ@V_{GS}=4.5V, I_D=2A
- Low on-resistance
- High speed : ton=24ns(typ.), toff=19ns(typ.)
- Pb-free package

Equivalent Circuit

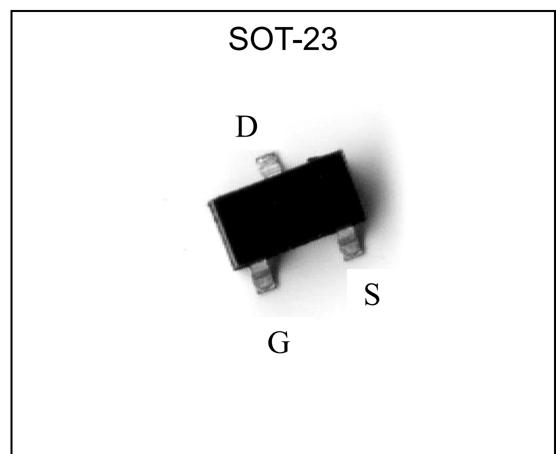
MTN3K14N3



G：Gate
S：Source
D：Drain

Outline

SOT-23



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	I_D	4 (Note 1)	A
Pulsed Drain Current	I_{DM}	8 (Note 2 & 3)	A
Maximum Power Dissipation	P_D	1.38	W
Linear Derating Factor		0.01	W/°C
Thermal Resistance, Junction to Ambient	$R_{th, j-a}$	90 (Note 1)	°C/W
Operating Junction and Storage Temperature	Tj, Tstg	-55 ~ +150	°C

Note : 1. Surface mounted on 1 in² copper pad of FR4 board; 270°C/W when mounted on min. copper pad
2. Pulse width limited by maximum junction temperature
3. Pulse width≤300μs, duty cycle≤2%

Electrical 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
$V_{GS(th)}$	1.0	-	2.5	V	V_{DS}=V_{GS}, I_D=250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0
I_{DSS}	-	-	1	μA	V_{DS}=30V, V_{GS}=0
	-	-	10	μA	V_{DS}=24V, V_{GS}=0, Tj=55°C
*$R_{DS(ON)}$	-	-	39	mΩ	I_D=2A, V_{GS}=10V
	-	-	57		I_D=2A, V_{GS}=4.5V
	-	-	67		I_D=2A, V_{GS}=4.0V
*G_{FS}	-	6.4	-	S	V_{DS}=5V, I_D=2A
Dynamic					
Ciss	-	460	-	pF	V_{DS}=15V, V_{GS}=0, f=1MHz
Coss	-	62	-		
Crss	-	106	-		
*$t_{d(ON)}$	-	24	-	ns	V_{DS}=15V, I_D=2A, V_{GS}=4V, R_G=10Ω
*t_r	-	15	-		
*$t_{d(OFF)}$	-	19	-		
*t_f	-	6	-		
*Qg	-	5.0	-	nC	V_{DS}=24V, I_D=4A, V_{GS}=4V
Source-Drain Diode					
*V_{SD}	-	-	1.2	V	V_{GS}=0V, I_S=1.2A

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

Ordering Information

Device	Package	Shipping	Marking
MTN3K14N3	SOT-23 (Pb-free)	3000 pcs / Tape & Reel	3K14

Characteristic Curves

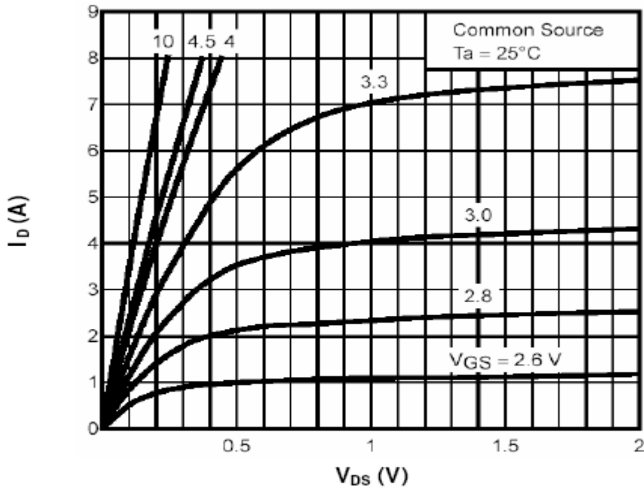


Fig 1. Typical Output Characteristics

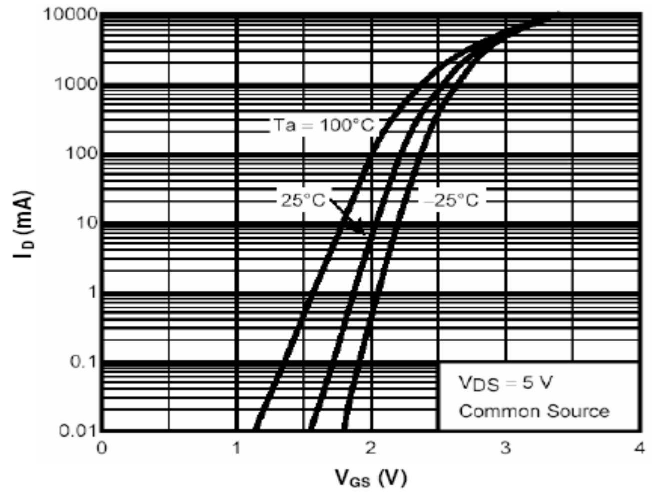


Fig 2. Transfer Characteristics

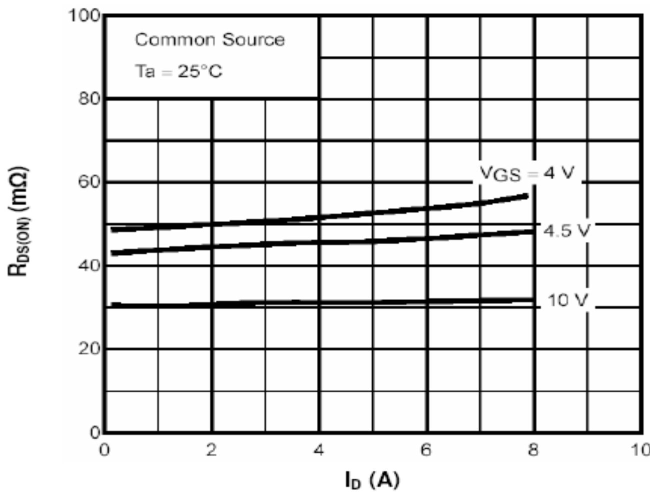


Fig 3. On-Resistance vs. Drain Current and Gate Voltage

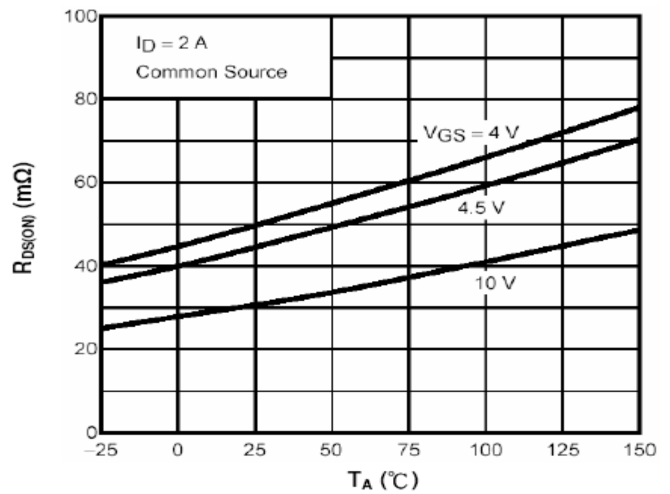


Fig 4. On-Resistance vs. Ambient Temperature

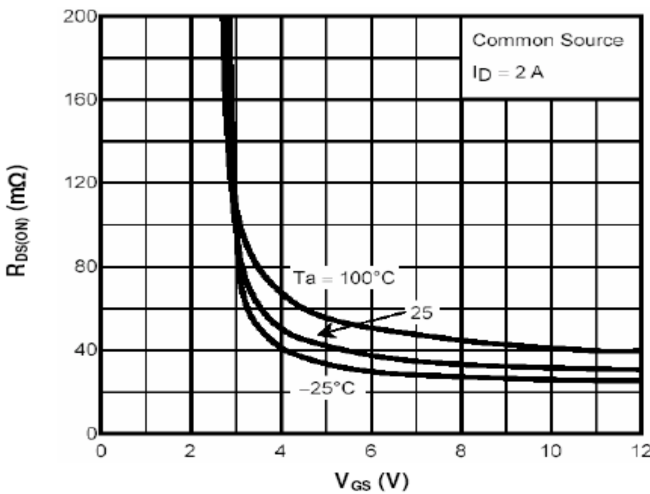


Fig 5. On-Resistance vs. Gate-Source Voltage

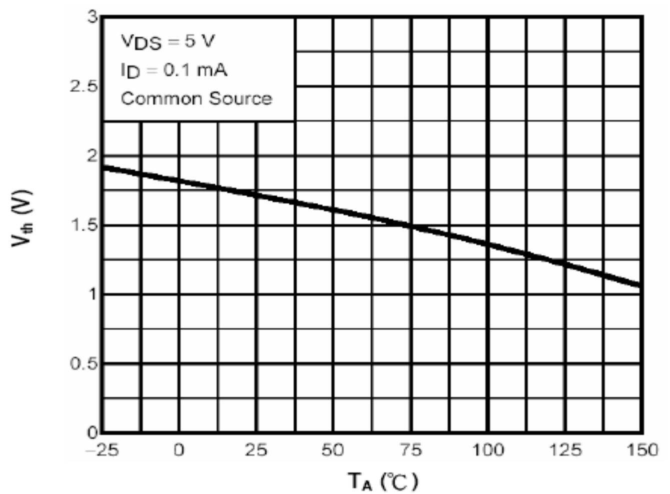


Fig 6. Gate Threshold Voltage vs. Ambient Temperature

Characteristic Curves(Cont.)

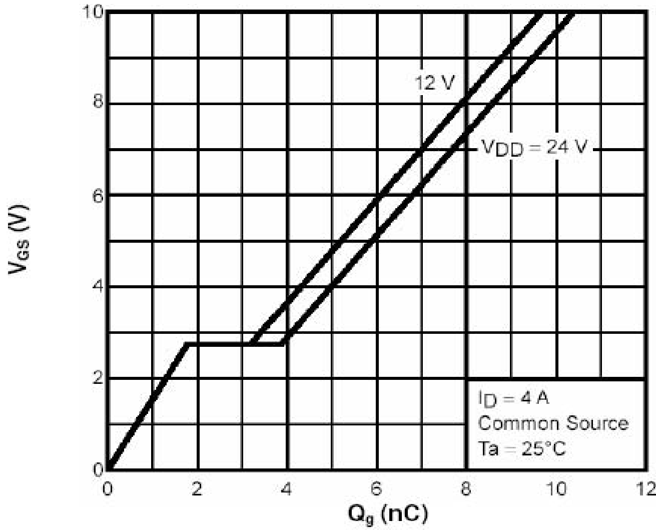


Fig 7. Gate Charge Characteristics

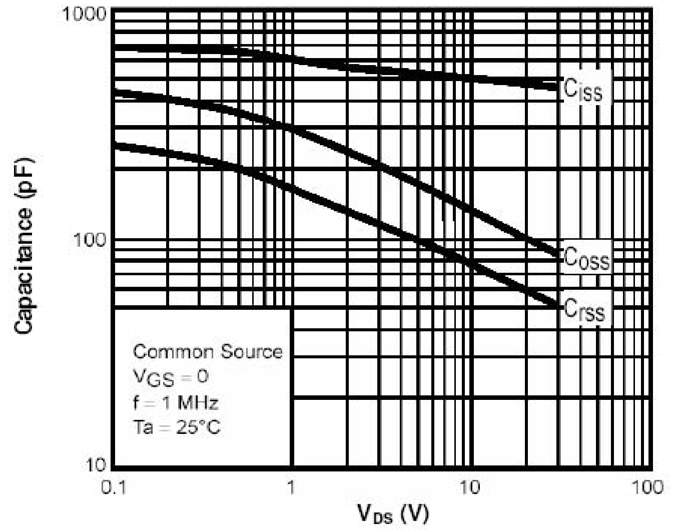


Fig 8. Typical Capacitance Characteristic

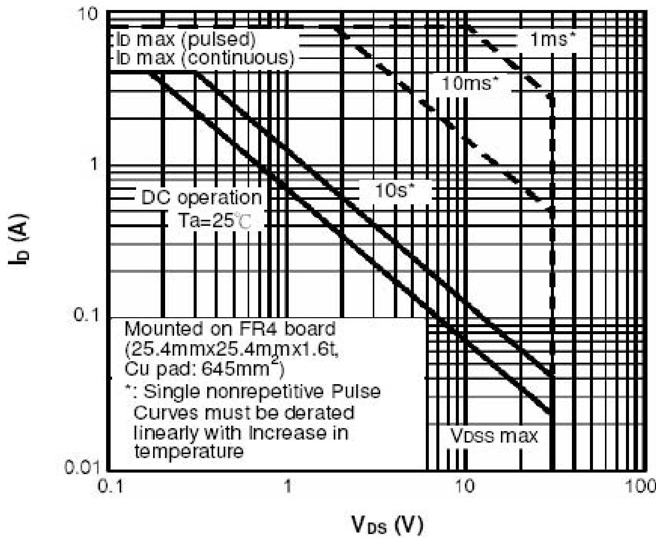


Fig 9. Maximum Safe Operating Area

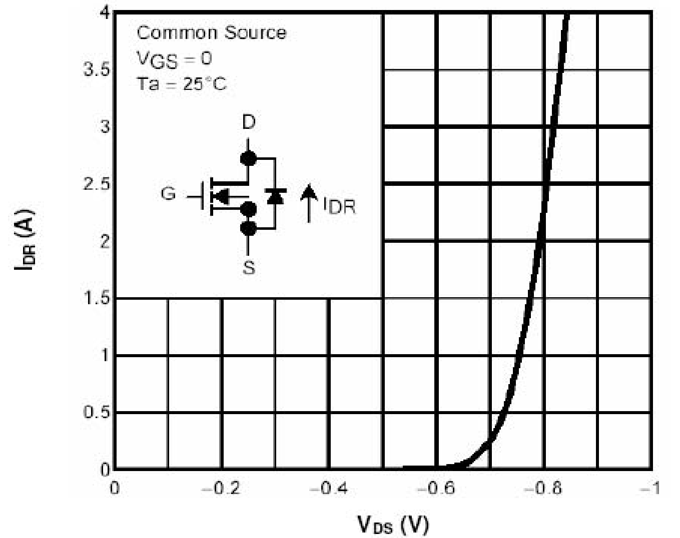


Fig 10. Body Diode Characteristics

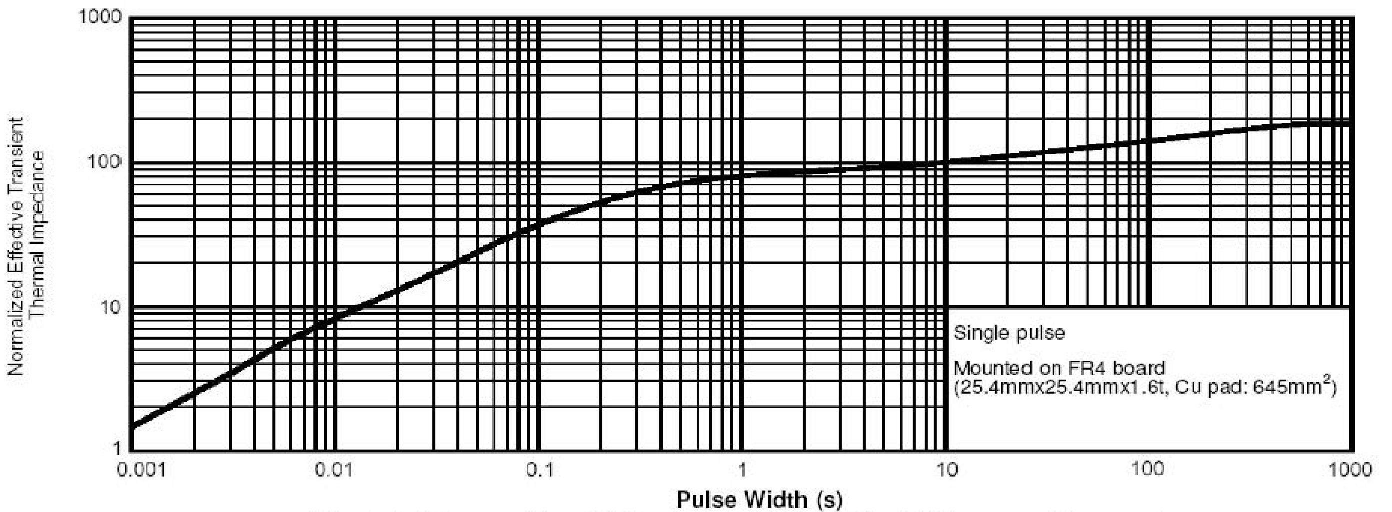
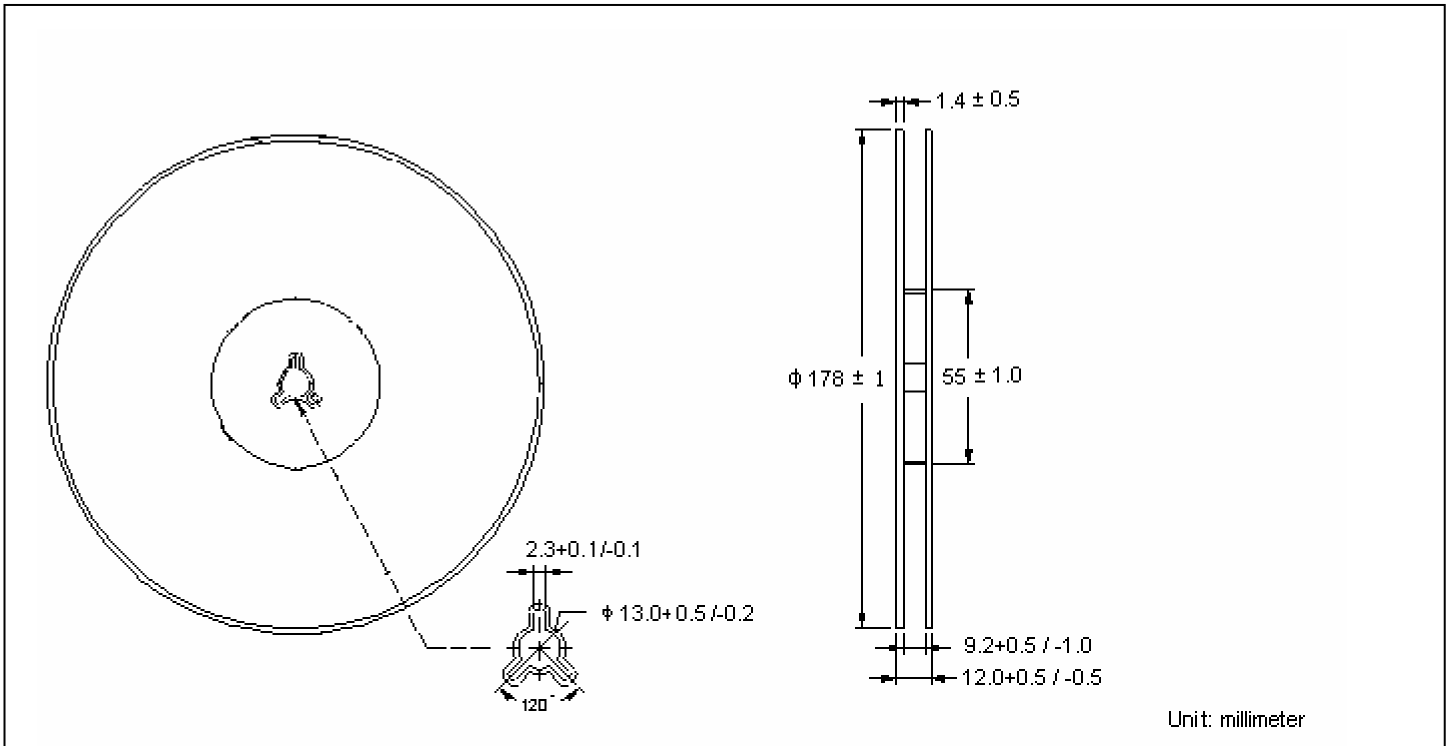


Fig 11. Normalized Maximum Transient Thermal Impedance

Reel Dimension



Carrier Tape Dimension

2±0.05 See Note6
4.0±0.1 See Note1
0.22±0.02
B
1.5+0.1/-0
B
A
1.75±0.1
0.6
3.5±0.05 See Note5
R0
3K14
8+0.3/-0.1
A0
4.0±0.1
0.2 Max
A
1.0±0.1
K0
Section A-A
Section B-B

Ao=3.10±0.15
Bo=2.78±0.12
Ko=1.22±0.1

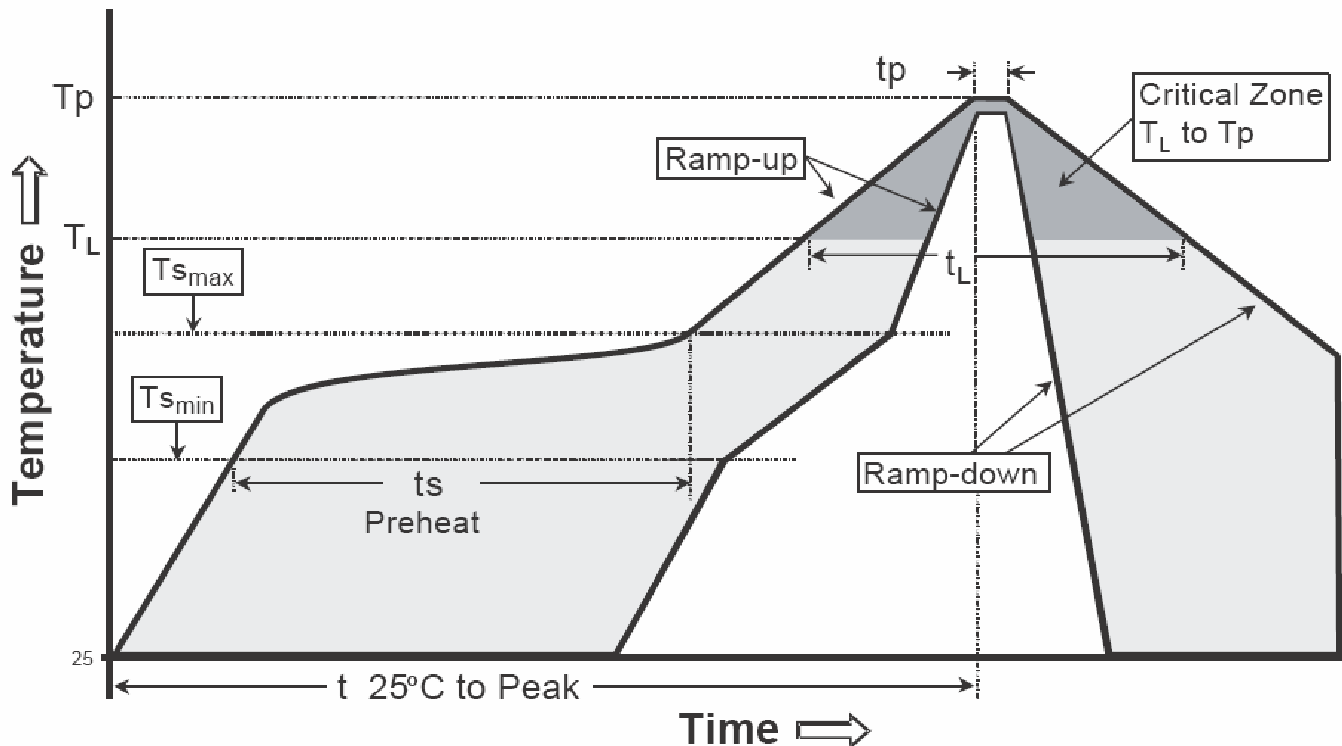
Notes:
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material : conductive Black Polystyrene.
4. Ao & Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Unit : millimeter

Recommended wave soldering condition

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

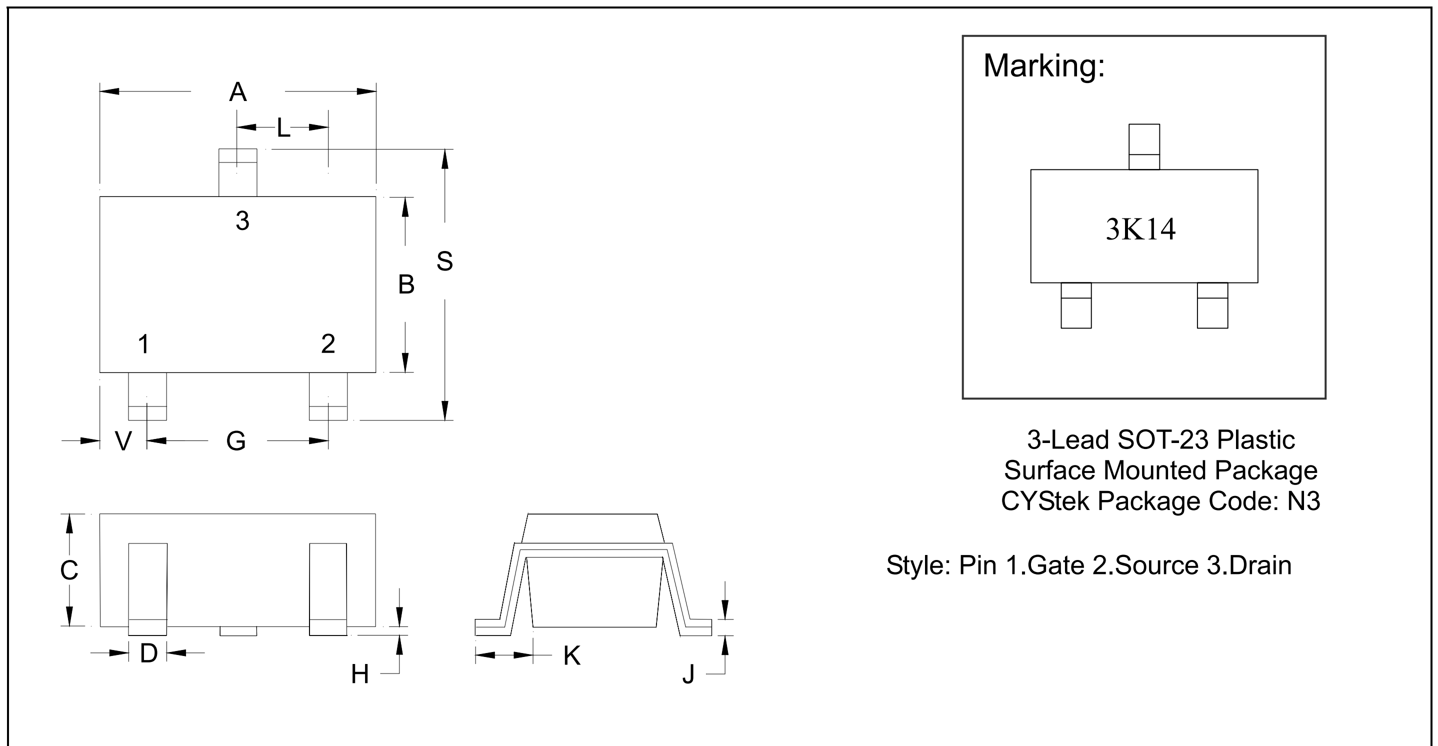
Recommended temperature profile for IR reflow



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-23 Dimension



3-Lead SOT-23 Plastic
Surface Mounted Package
CYStek Package Code: N3

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

*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1102	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 ; solder plating
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

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