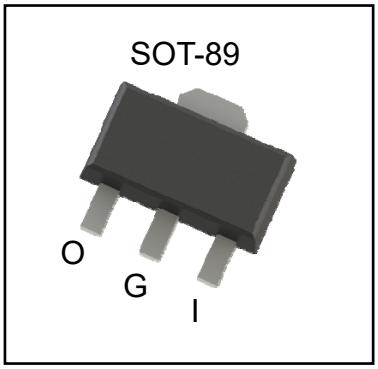
30V 100mA Low Dropout Voltage Regulator

ICR78LXXM3



Description

The ICR78LXXM3 positive regulators are available with 5V and 3.3V fixed output voltages, making them useful in a wide range of applications. Used as a Zener diode and resistor combination replacement, ICR78LXXM3 usually provides an effective output impedance improvement of two orders of magnitude and lower quiescent current. These regulators can provide local on-card regulation, eliminating distribution problems associated with single point regulation. The available voltages allows ICR78LXXM3 to be used in logic systems, instrumentation, HiFi, and other solid state electronic equipments.
Each type employs internal current limiting, thermal shut-down and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, the regulator can deliver over 100mA output current.

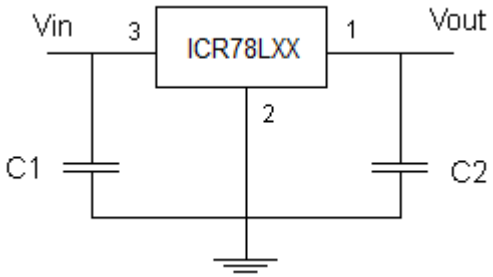
Features:

- V_{IN} range up to 30V
- Output voltage tolerance of ±5% over the temperature range
- Output current of 100mA
- Output transistor safe area protection
- Internal thermal overload protection
- Internal short-circuit current limit
- Pb-free lead plating and halogen-free package

Applications:

- Battery chargers
- Portable instrumentation
- LED lighting
- Low wattage power supplies

Typical Application Circuit:



Note : C1 and C2 are required if regulator is located far from power supply filter and load, or oscillation may induced on the loop.

Ordering Information

Device	Output Voltage Tolerance	Package	Shipping
ICR78LXXM3-A-T2-G	±3%	SOT-89 (Pb-free lead plating and halogen-free package)	1000 pcs / Tape & Reel
ICR78LXXM3-B-T2-G	±5%		

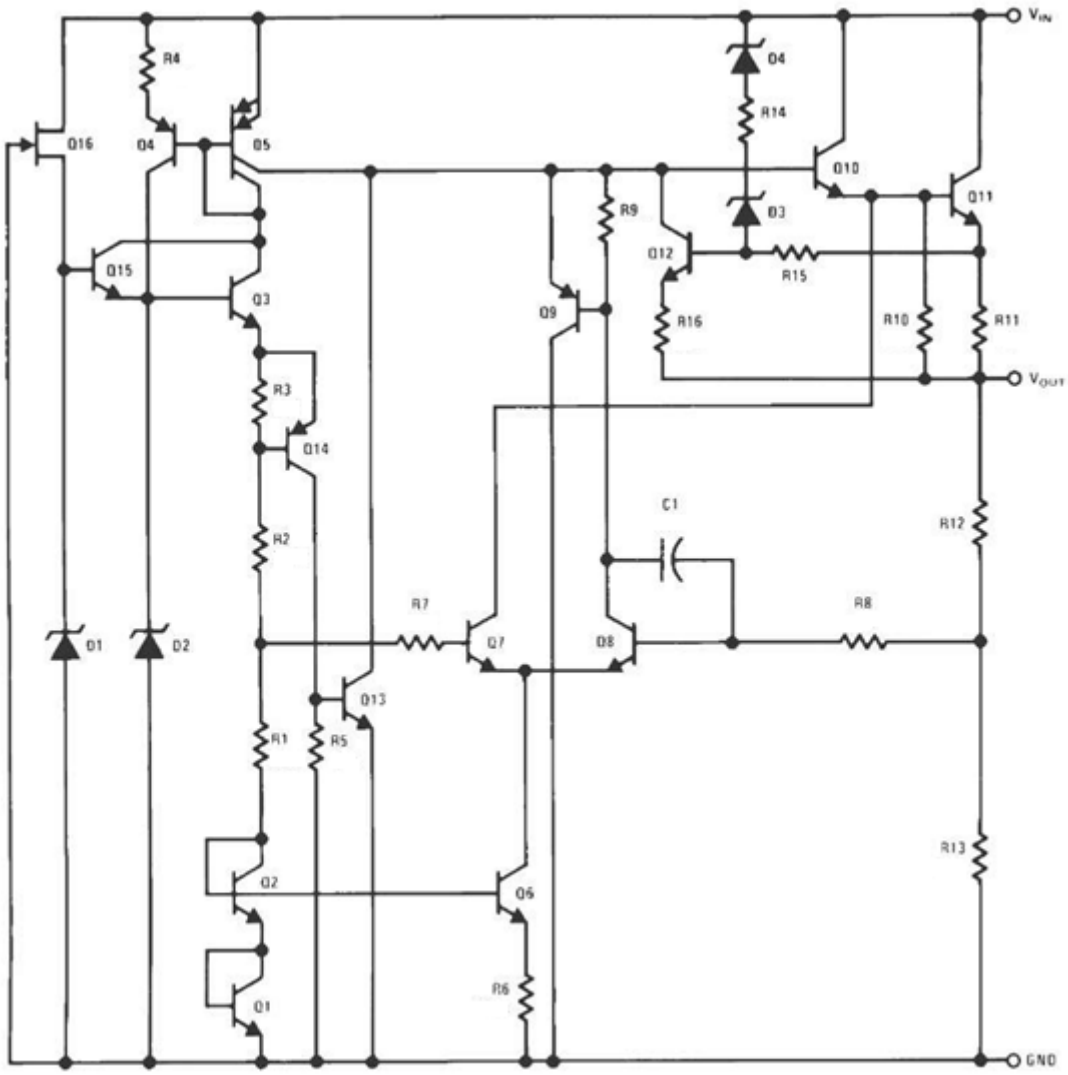
Environment friendly grade : S for RoHS compliant products, G for RoHS compliant and green compound products

Packing spec, T2 :1000 pcs/tape & reel, 7" reel ; TB : 2000 pcs/ tape & box

Product rank, zero for no rank products

Product name

Function Block Diagram:



Absolute Maximum Ratings

Parameter	Ratings	Unit
Input Voltage	30	V
Output Current	100	mA
Operating Junction Temperature Range	-40 ~ +125	℃
Storage Temperature Range	-65 ~ +150	℃
Power Dissipation	500 (Note)	mW

Note : When mounted on minimum pad size and tested in free air condition, without heat sinking.

Electrical Characteristics

ICR78L33M3

(Vin=10V, Io=40mA, Tj=25°C, Cin=0.33uF, Cout=0.1uF ,unless otherwise noted) (Note 1)

Symbol		Parameter	Min	Typ	Max	Conditions	Units
Vo	A-rank(3%)	Output Voltage	3.20	3.3	3.40	Vin=10V, Io=40mA,Tj=25°C	V
	B-rank(5%)		3.13		3.47		
			3.13	-	3.47	7V≤Vin≤20V, 1mA≤Io≤40mA Vin=10V, 1mA≤Io≤70mA (Note 2)	
ΔVo		Line Regulation	-	12	30	7V≤Vin≤20V	mV
			-	10	25	8V≤Vin≤20V	
ΔVo		Load Regulation	-	20	50	1mA≤Io≤100mA	mV
			-	10	25	1mA≤Io≤40mA	
IQ		Quiescent Current	-	0.3	1.2	Tj=25°C, Vin=10V, Io=0mA	mA
ΔIQ		Quiescent Current Change	-	-	0.2	8V≤Vin≤20V	mA
			-	-	0.1	1mA≤Io≤40mA	
Vn		Output Noise Voltage	-	32	-	10Hz≤f≤100KHz	μV
ΔVin / ΔVout		Ripple Rejection	75	84	-	8V≤Vin≤20V, f=120Hz	dB
ΔVo/ΔTj		Temperature Stability	-	0.2	0.5	Io=5mA, 0°C ≤Tj≤125°C	mV/℃
VD		Dropout Voltage	-	0.8	-	Io=40mA	V

ICR78L05M3

(Vin=10V, Io=40mA, Tj=25°C, Cin=0.33uF, Cout=0.1uF ,unless otherwise noted) (Note 1)

Symbol		Parameter	Min	Typ	Max	Conditions	Units
Vo	A-rank(3%)	Output Voltage	4.85	5	5.15	Vin=10V, Io=40mA,Tj=25°C	V
	B-rank(5%)		4.75		5.25		
			4.75	-	5.25	7V≤Vin≤20V, 1mA≤Io≤40mA Vin=10V, 1mA≤Io≤70mA (Note 2)	
ΔVo		Line Regulation	-	12	30	7V≤Vin≤20V	mV
			-	10	25	8V≤Vin≤20V	
ΔVo		Load Regulation	-	20	50	1mA≤Io≤100mA	mV
			-	10	25	1mA≤Io≤40mA	
IQ		Quiescent Current	-	0.3	1.2	Tj=25°C, Vin=10V, Io=0mA	mA
ΔIQ		Quiescent Current Change	-	-	0.2	8V≤Vin≤20V	mA
			-	-	0.1	1mA≤Io≤40mA	
Vn		Output Noise Voltage	-	32	-	10Hz≤f≤100KHz	μV
ΔVin / ΔVout		Ripple Rejection	75	84	-	8V≤Vin≤20V, f=120Hz	dB
ΔVo/ΔTj		Temperature Stability	-	0.2	0.5	Io=5mA, 0°C ≤Tj≤125°C	mV/℃
VD		Dropout Voltage	-	0.8	-	Io=40mA	V

Note : 1. The maximum steady state usable output current is dependent on input voltage, heat sinking, lead length of the package and copper of PCB. The data above represent pulse test conditions with junction temperatures specified at the initial of test.
2. Power dissipation<0.5W

Typical Characteristics

@ V_{IN}=10V, I_{OUT}=40mA, C_{IN}=0.33uF, C_{OUT}=0.1uF, T_J=25°C, unless otherwise specified

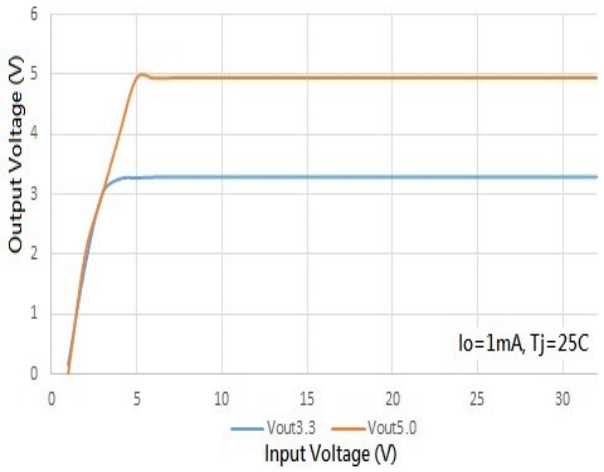


Fig 1. Output Voltage vs Input Voltage

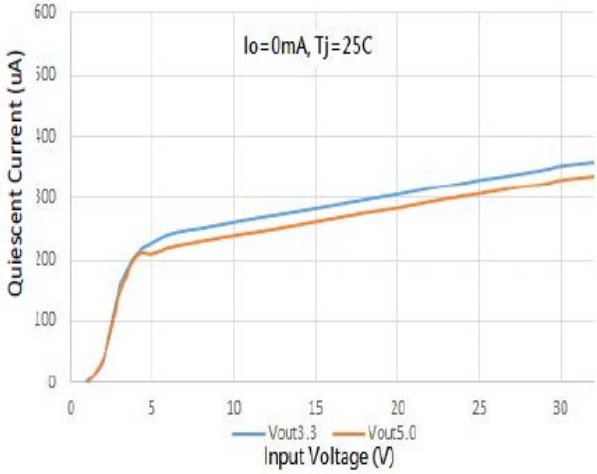


Fig 2. Quiescent Current vs Input Voltage

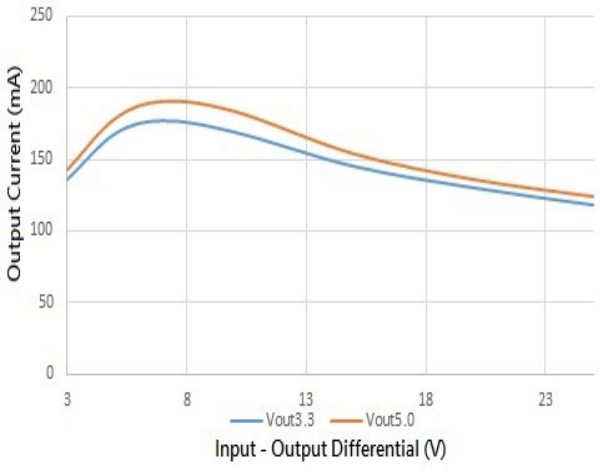


Fig 3. Peak Output Current vs Input-Output

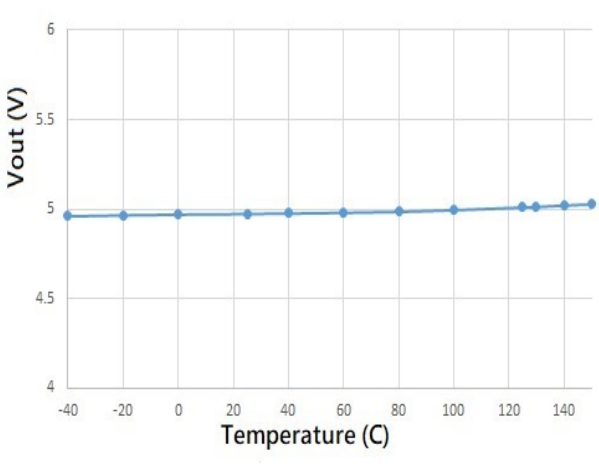


Fig 4. V_{OUT} vs Temp

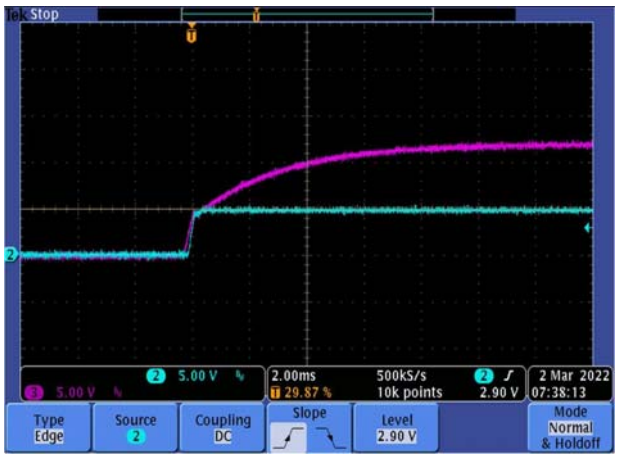


Fig 5. V_{IN} Start up

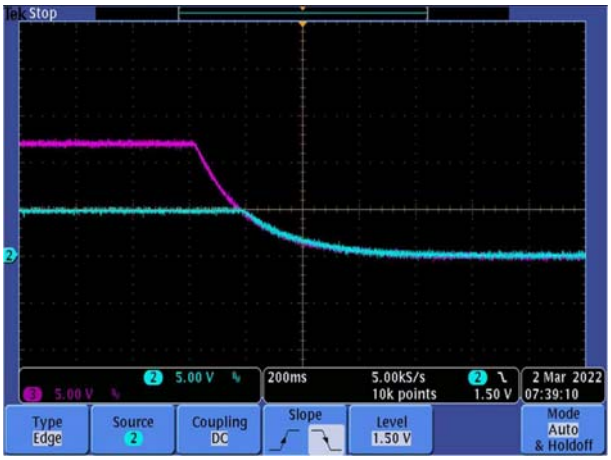


Fig 6. V_{IN} Power off

Typical Characteristics (Cont.)

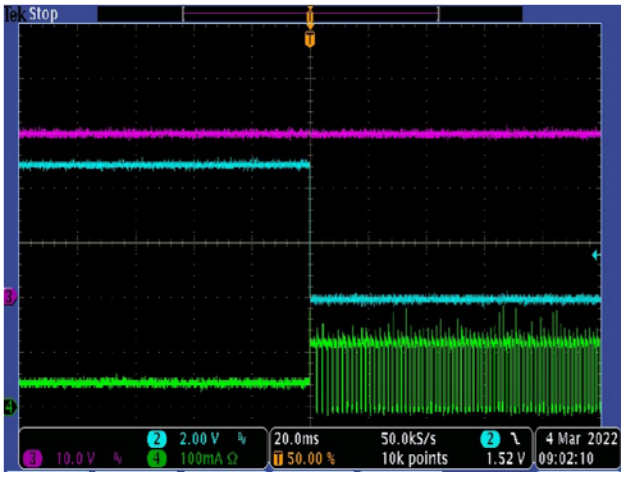


Fig 7. V_{OUT} Short to GND

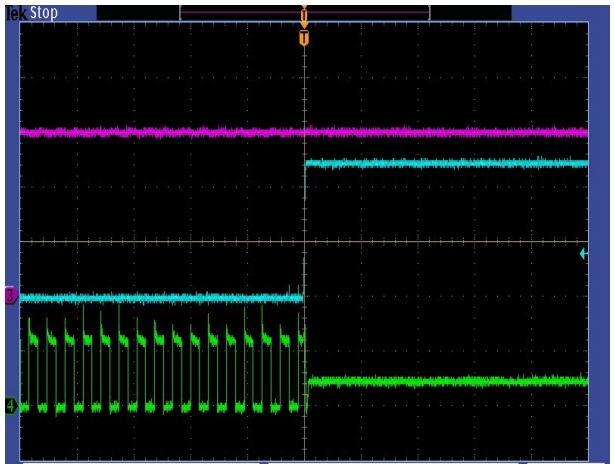


Fig 8. V_{OUT} Short and Release

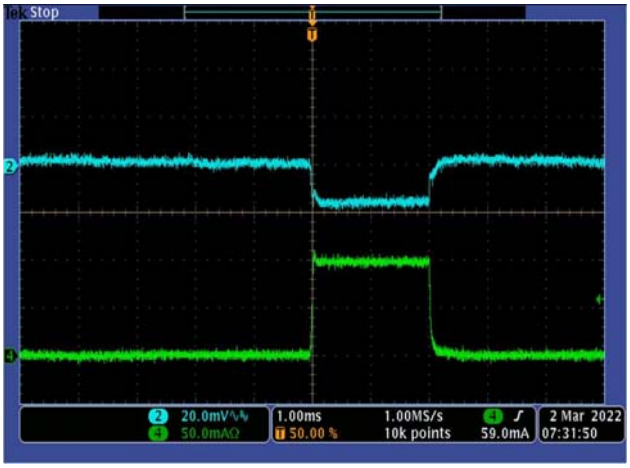


Fig 9. Load Transient

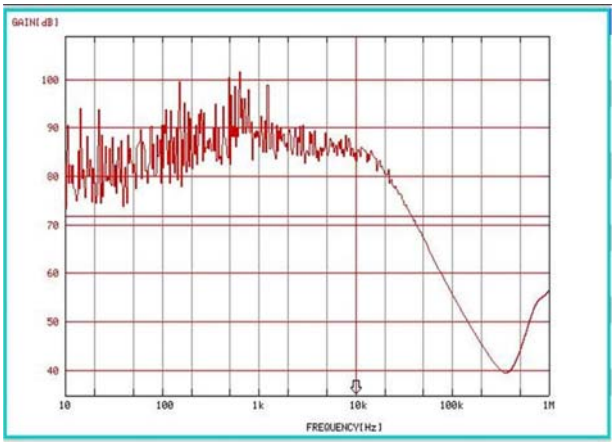
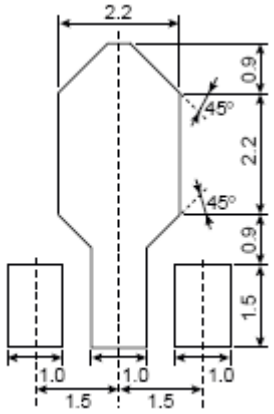


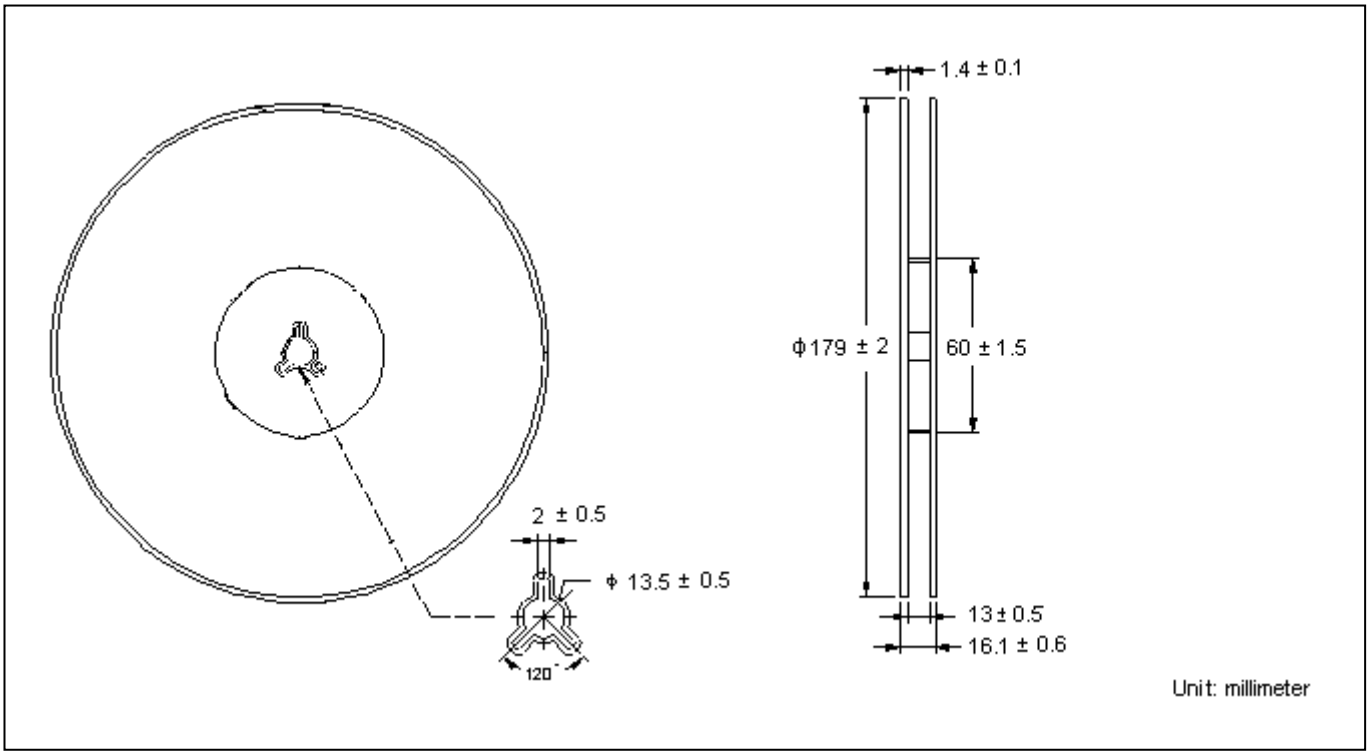
Fig 10. PSRR vs Frequency (V_{IN} = 9V, V_{OUT} = 5V)

Recommended Soldering Footprint

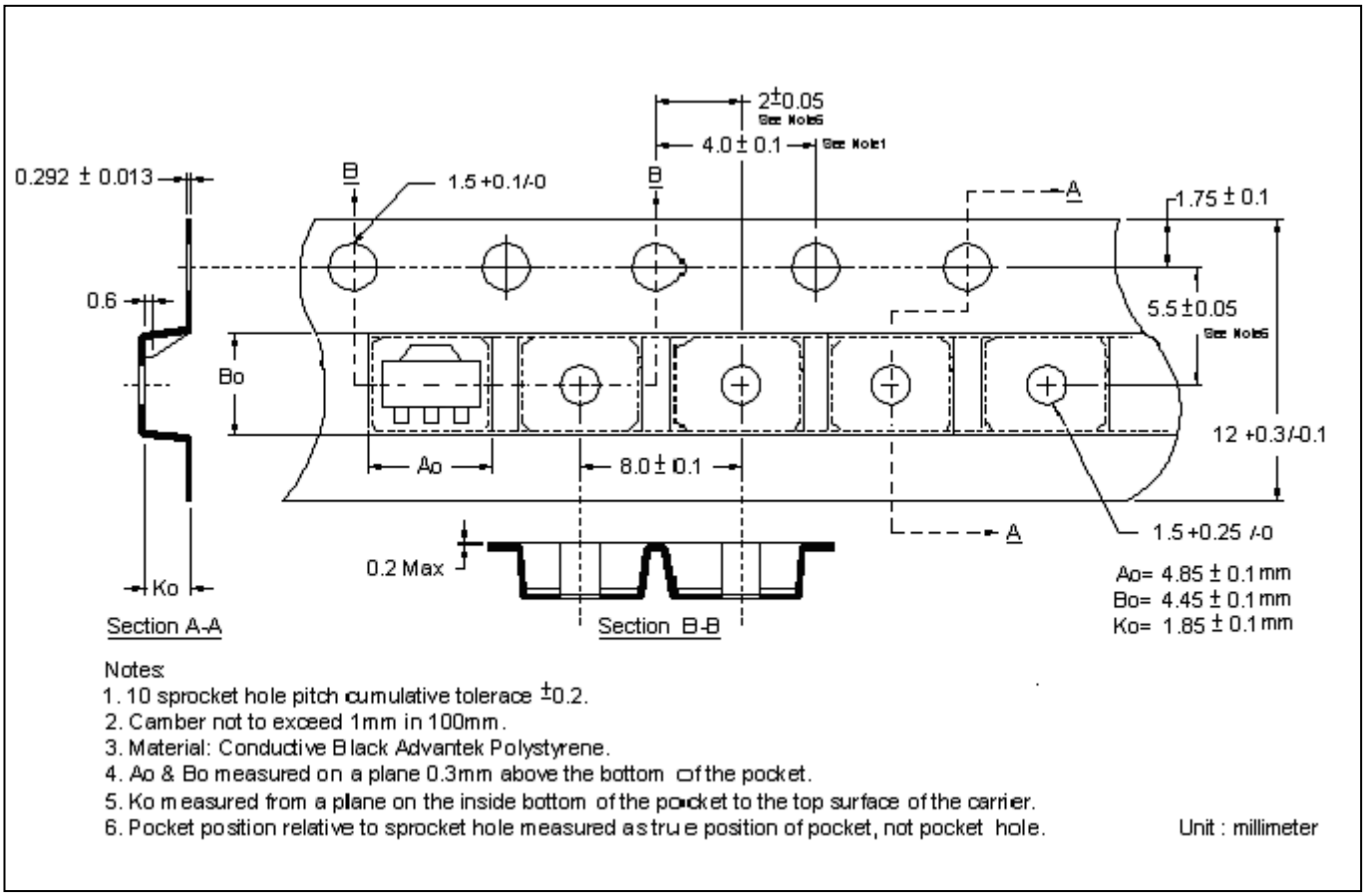


unit : mm

Reel Dimension



Carrier Tape Dimension



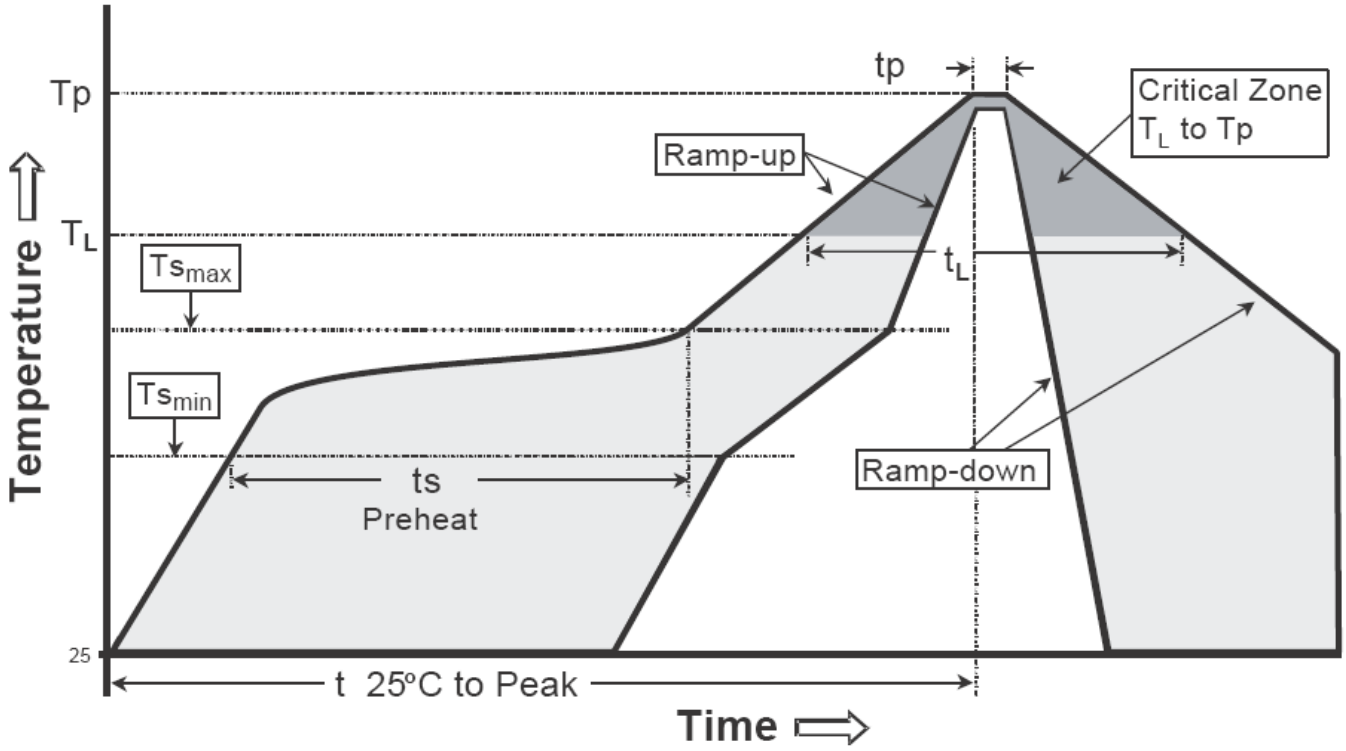
Notes:
1. 10 sprocket hole pitch cumulative tolerace ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material: Conductive Black Advantek Polystyrene.
4. Ao & Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of 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

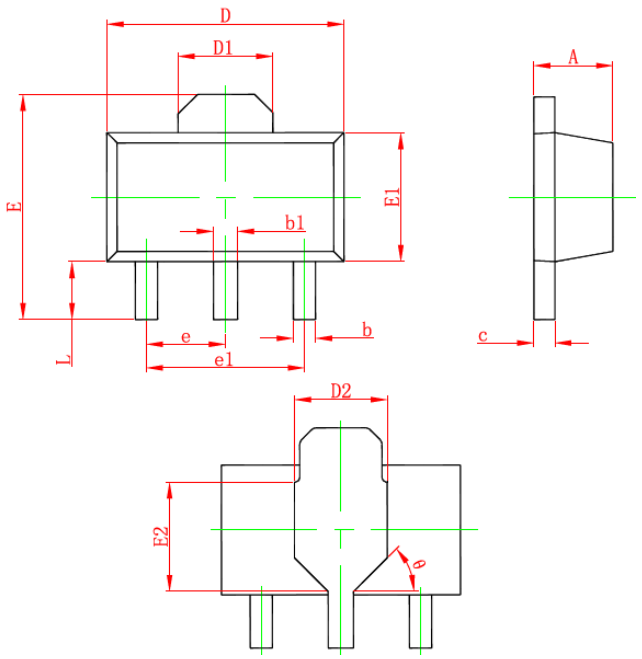
Recommended temperature profile for IR reflow



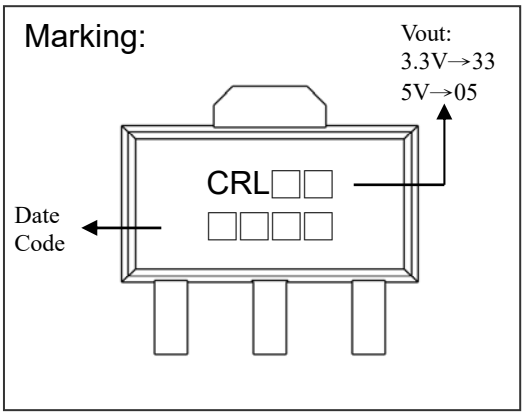
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time($t_{s\ min}$ to $t_{s\ max}$)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (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-89 Dimension



3-Lead SOT-89 Plastic
Surface Mounted Package
CYS Package Code: M3



Style: Pin 1. Vout 2. GND 3. Vin

Date Code(counting from left to right) :
1st code: year code, the last digit of Christian year
2nd code : month code, Jan→A, Feb→B, Mar→C,
Apr→D, May→E, Jun→F, Jul→G, Aug→H,
Sep→J, Oct→K, Nov→L, Dec→M
3rd and 4th codes : production serial number, 01~99

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.055	0.063	1.40	1.60	E	0.155	0.167	3.94	4.25
b	0.013	0.020	0.32	0.52	E1	0.091	0.102	2.30	2.60
b1	0.016	0.023	0.40	0.58	E2	0.075 REF.		1.90 REF.	
c	0.014	0.017	0.35	0.44	e	0.060 TYP.		1.50 TYP.	
D	0.173	0.181	4.40	4.60	e1	0.118 TYP.		3.00 TYP.	
D1	0.061 REF.		1.55 REF.		L	0.035	0.047	0.90	1.20
D2	0.069 REF.		1.75 REF.		θ	45°		45°	

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.