

30V 100mA Low DropOut Voltage Regulator

The HT78L05 three terminal positive regulators is available with 5V fixed output voltage, making it useful in a wide range of applications. Used as a Zener-diode and resistor combination replacement, the HT78L05 usually provides an effective output impedance improvement of two orders of magnitude and lower quiescent current.

The HT78L05 is available in the plastic TO-92 package, SOT89-3 package, and SOP8 package. With adequate heat sinking, the regulator can deliver 100-mA output current. Current limiting is included to limit the peak output current to a safe value.

Features

- V_{IN} Range up to 30V
- Output Voltage Tolerances of $\pm 5\%$ Over the Temperature Range
- Output Current of 100 mA
- Output Transistor Safe Area Protection
- Internal Thermal Overload Protection
- Internal Short-Circuit Current Limit
- Available in TO-92, SOT-893, XDFN4, SOP8 Low Profile Packages

Applications

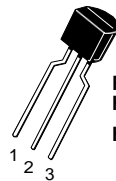
- Battery Chargers
- Portable Instrumentation
- LED Lighting
- Low Wattage Power Supplies

PIN CONNECTIONS



**SOP8
R SUFFIX
HT78L05BRZ
HT78L33BRZ**

Pin 1. V_{OUT}
2. GND
3. GND
4. NC.
5. NC.
6. GND
7. GND
8. V_{IN}



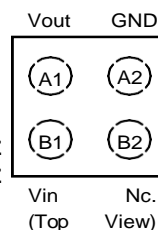
**TO92
P SUFFIX
HT78L05BRPZ
HT78L33BRPZ**

BENT LEAD TAPE
& REEL AMMO
PACK

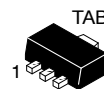
Pin 1. V_{out}
2. GND
3. V_{in}



**XDFN4
X SUFFIX
HT78L05BRXZ
HT78L33BRXZ**



Pin
A1. V_{out}
A2. GND
B1. V_{in}
B2. N.C.

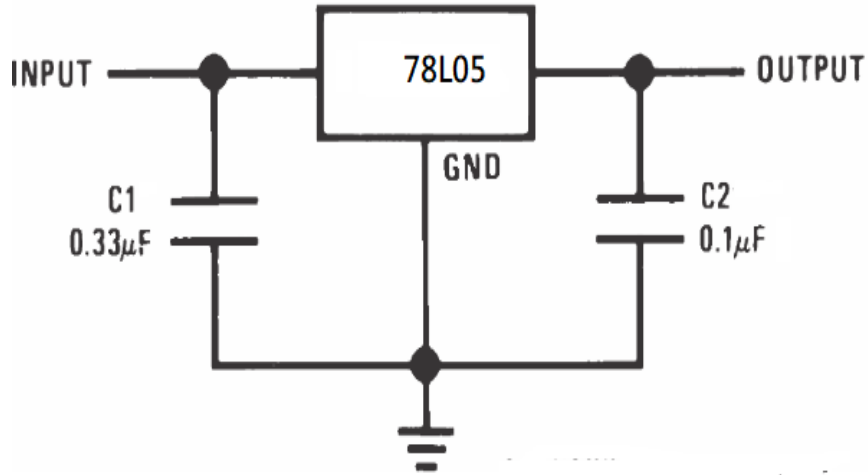


**SOT-89 H
SUFFIX
HT78L05BRHZ
HT78L33BRHZ**

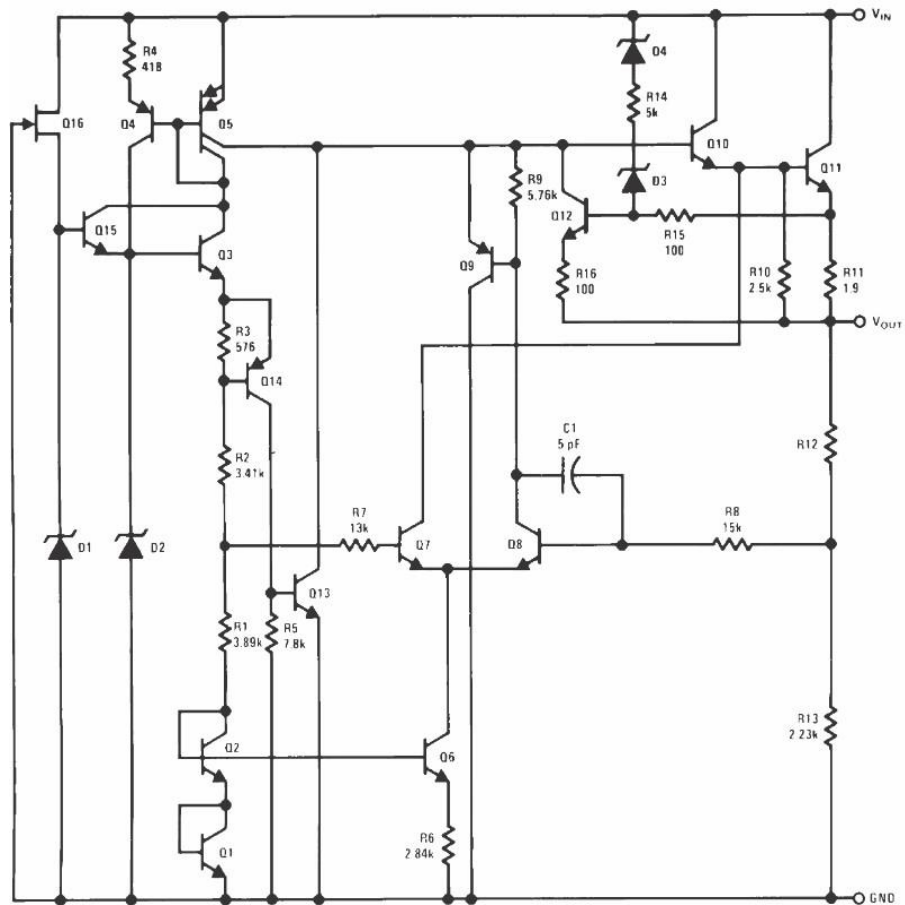
Pin 1. V_{out}
2. GND
3. V_{in}

$T_A = -40^\circ$ to 125°C for all packages

Typical Application Circuit



Function Block Diagram



Absolute Maximum Ratings (Note1)

- V_{IN} ----- -0.3V to +35V
- Junction Temperature-----125°C
- Lead Temperature (Soldering, 10 sec.)-----300°C
- Storage Temperature ----- -65°C to 150°C

Recommended Operating Conditions

- Input Voltage, V_{IN} ----- +7V to +30V
- Junction Temperature ----- -40°C to 125°C

Electrical Characteristics
 $V_{IN}=10V$, $I_{OUT}=40mA$, $C_{IN}=0.33\mu F$, $C_{OUT}=0.1\mu F$, $T_J=25^\circ C$, unless otherwise specified

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Output Voltage (HT78L33)	V_{OUT}	$T_J = 25^\circ C$	3.168	3.3	3.432	V
		$V_{IN} = 7$ to 20V, $I_{OUT} = 1mA$ to 40mA $T_J = 0^\circ C$ to 125°C	3.135		3.465	
		$I_{OUT} = 1mA$ to 70mA $T_J = 0^\circ C$ to 125°C	3.135		3.465	
Output Voltage (HT78L05)	V_{OUT}	$T_J = 25^\circ C$	4.8	5	5.2	V
		$V_{IN} = 7$ to 20V, $I_{OUT} = 1mA$ to 40mA $T_J = 0^\circ C$ to 125°C	4.75		5.25	
		$I_{OUT} = 1mA$ to 70mA $T_J = 0^\circ C$ to 125°C	4.75		5.25	
Line Regulation	ΔV_{LINE}	$V_{IN} = 7$ to 20V, $V_{IN} = 8$ to 20V,		8 5	30 25	mV
				20 10	60 30	
Load Regulation	ΔV_{LOAD}	$I_{OUT} = 1mA$ to 100mA		20	60	mV
		$I_{OUT} = 1mA$ to 40mA		10	30	
Quiescent Current	I_Q	$T_J = 25^\circ C$		0.3		mA
		$T_J = 125^\circ C$			1	
Quiescent Current Change	ΔI_Q	$V_{IN} = 8$ to 20V, $T_J = 0^\circ C$ to 125°C			0.2	mA
		$I_{OUT} = 1mA$ to 40mA $T_J = 0^\circ C$ to 125°C			0.1	
Ripple Rejection	$\Delta V_{IN}/\Delta V_{OUT}$	$f = 120Hz$, $V_{IN} = 8V$ to 16V, $T_J = 25^\circ C$	75	84		dB
Output Noise Voltage	V_N	$f = 10Hz$ to 100KHz		32		μV
Dropout Voltage	V_{DROP}			0.8		V
V_{OUT} Temp. Coefficient	$\Delta V_{OUT}/\Delta T$	$I_{OUT} = 5mA$		0.2	0.5	$mV/^\circ C$
Peak Output Current	I_{PK}			170		mA

Typical Characteristics

$V_{IN}=10V$, $I_{OUT}=40mA$, $C_{IN}=0.33\mu F$, $C_{OUT}=0.1\mu F$, $T_J=25^\circ C$, unless otherwise specified

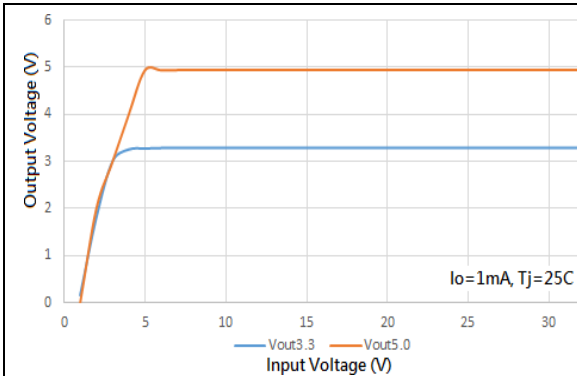


Fig 1. Output Voltage vs Input Voltage

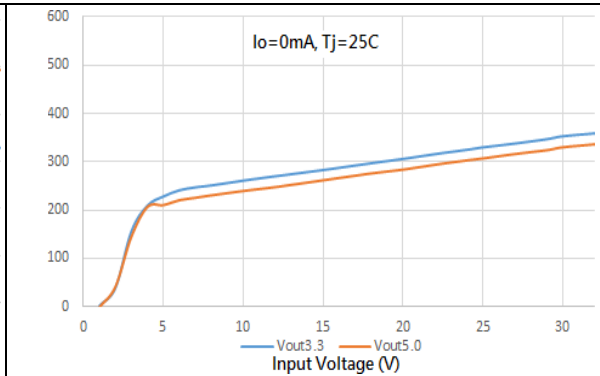


Fig 2. Quiescent Current vs Input Voltage

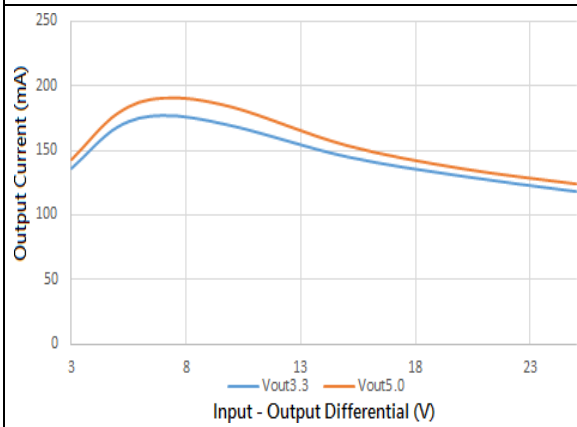


Fig 3. Peak Output Current vs Input-Output Differential

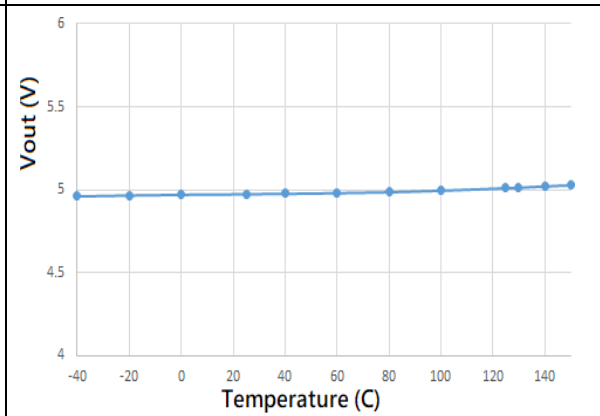


Fig 4. V_{OUT} vs Temp

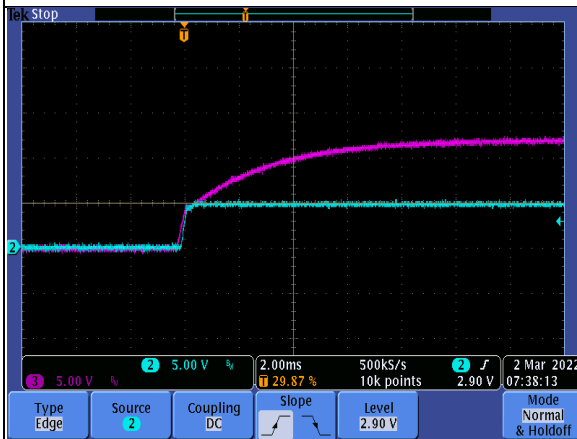


Fig 5. V_{IN} Start up

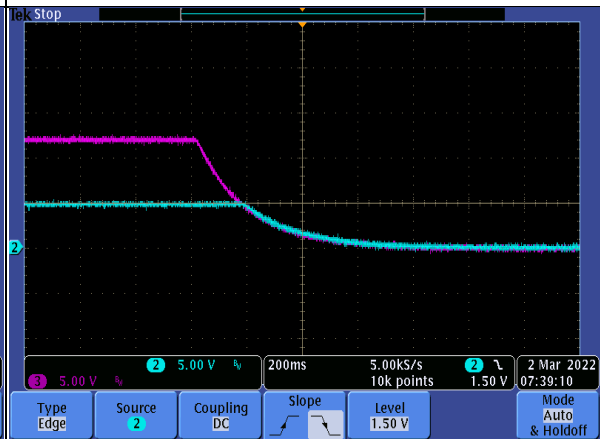


Fig 6. V_{IN} Power off

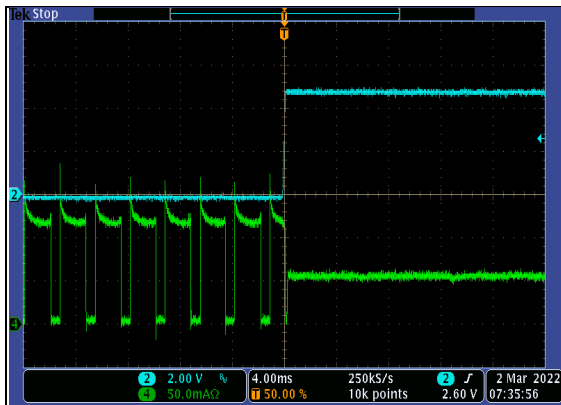


Fig 7. V_{OUT} Short to GND and Release

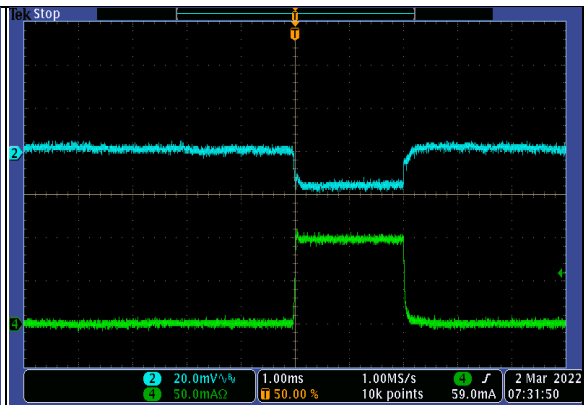
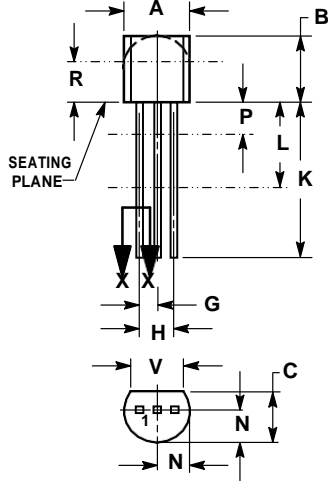


Fig 8. Load Transient

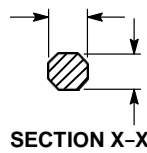
TO-92



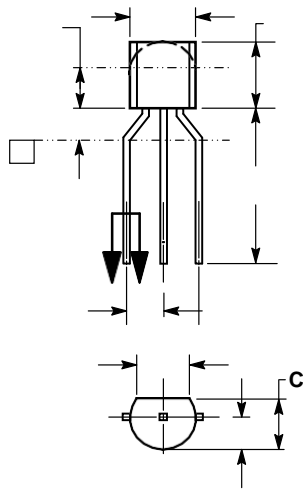
**STRAIGHT LEAD
 BULK PACK**

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.



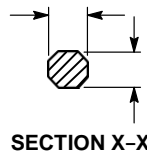
SECTION X-X



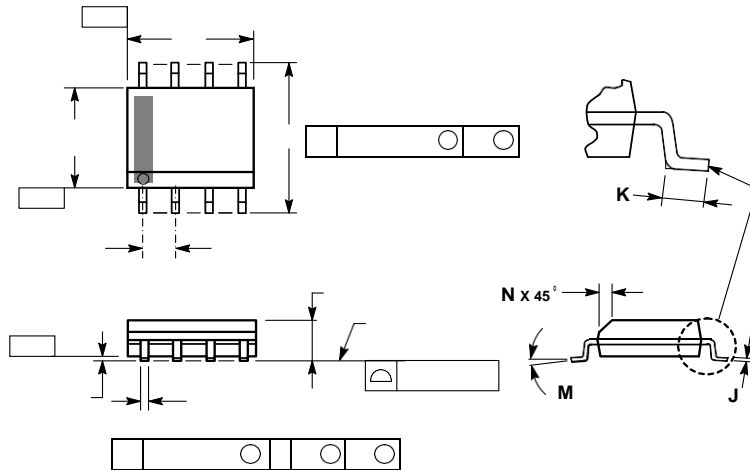
**BENT LEAD
 TAPE & REEL
 AMMO PACK**

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

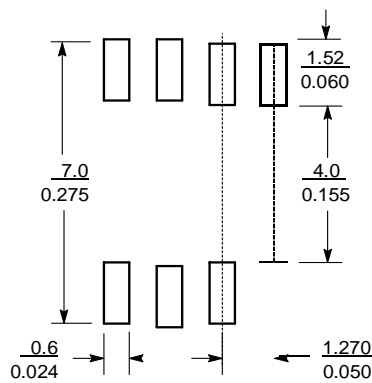


SECTION X-X

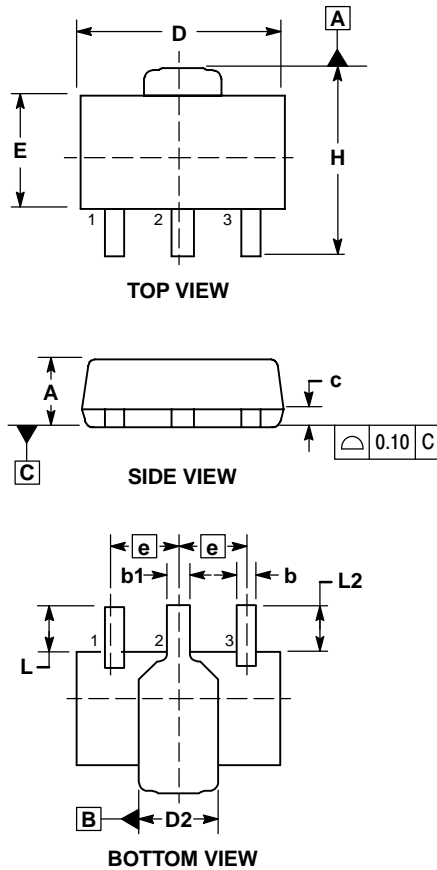
SOIC-8


1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

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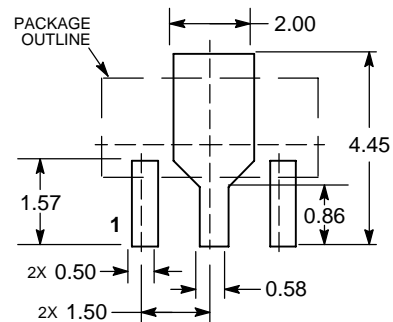
SOLDERING FOOTPRINT*

 SCALE 6:1 $\frac{\text{mm}}{\text{inches}}$

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

SOT-89


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 2. CONTROLLING DIMENSION: MILLIMETERS.
 3. LEAD THICKNESS INCLUDES LEAD FINISH.
 4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
 5. DIMENSIONS L, L2, D2, AND H ARE MEASURED AT DATUM PLANE C.
 6. CENTER LEAD CONTOUR MAY VARY WITHIN THE REGION DEFINED BY DIMENSION E.
 7. DIMENSION D2 IS DEFINED AT ITS WIDEST POINT.

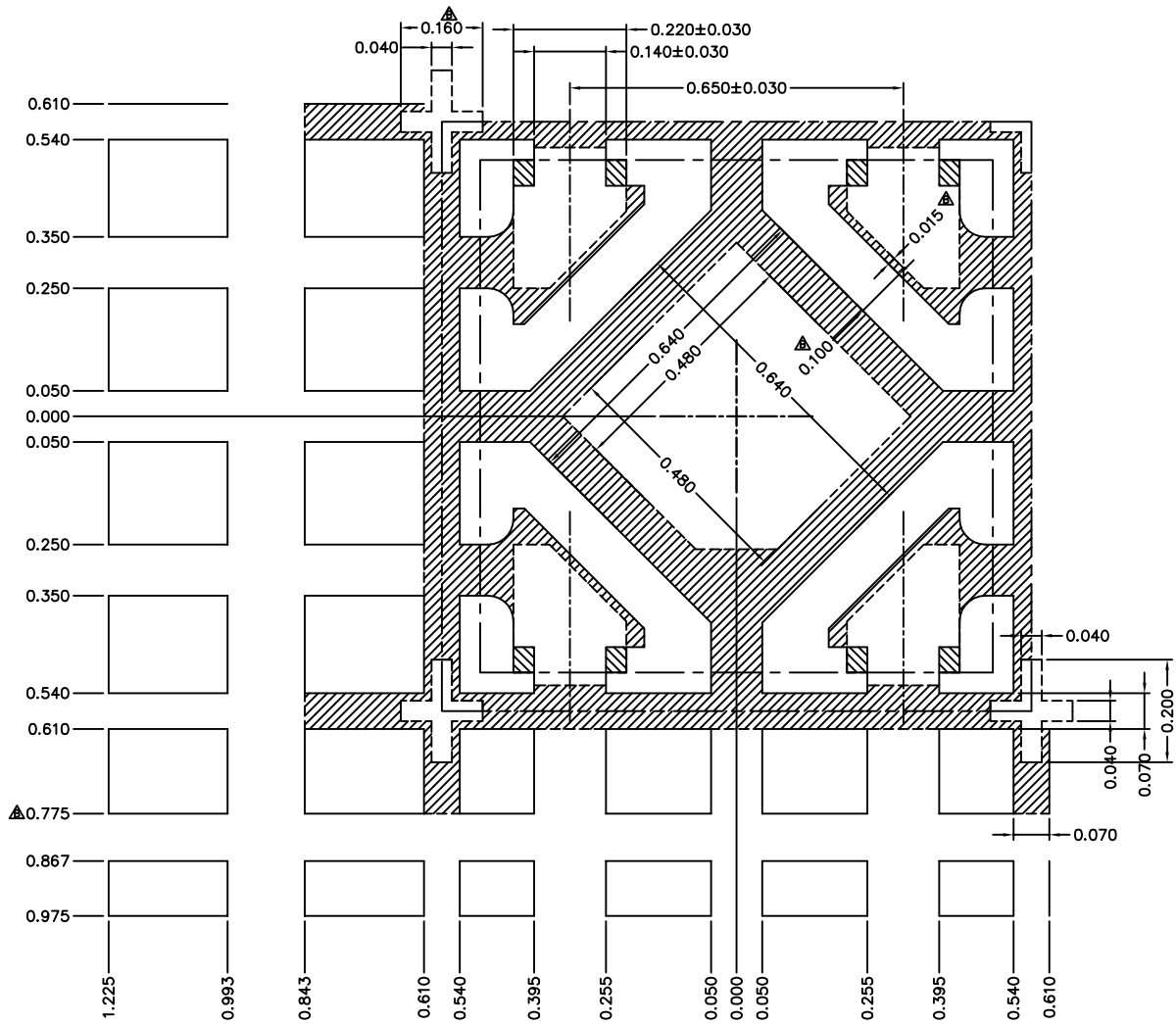
DIM	MILLIMETERS	
	MIN	MAX
A	1.40	1.60
b	0.38	0.47
b1	0.46	0.55
c	0.40	0.44
D	4.40	4.60
D2	1.60	1.90
E	2.40	2.60
e	1.50 BSC	
H	4.05	4.25
L	0.89	1.20

RECOMMENDED MOUNTING FOOTPRINT*




DIMENSIONS: MILLIMETERS

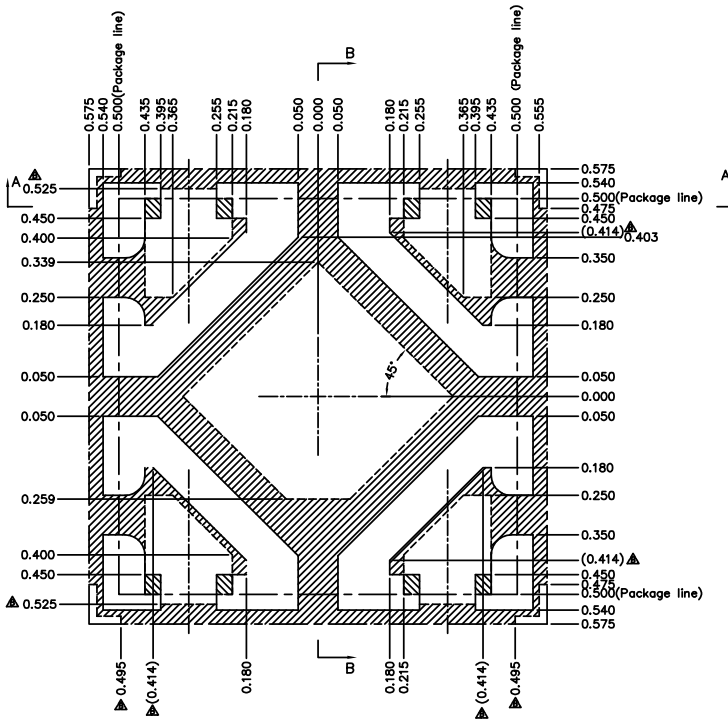
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XQFN4(1*1)

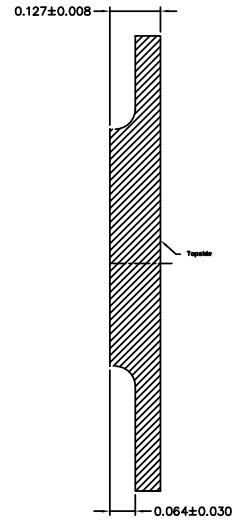


OP VIEW



-  Half etch on bottom
-  Half etch on top

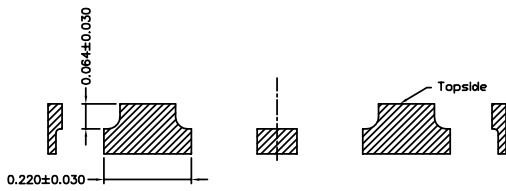


TOP VIEW



SECTION B-B

-  Half etch on bottom
-  Half etch on top



SECTION A-A

NOTES :

	MIN.	NOM.	MAX.
1 MATERIAL THICKNESS – C7025 HH	0.119	0.127	0.135
2 PILOT HOLE DIAMETER	1.499	1.524	1.549
3 EXTERNAL LEAD WIDTH (BOTTOM)	–	–	–
4 LEAD TIP FLAT WIDTH	–	–	–
5 STRIP LENGTH	249.900	250.000	250.100
6 STRIP WIDTH	69.950	70.000	70.050
7 UNIT PITCH	121.975	122.000	122.025
8 CUMULATIVE PITCH	121.975	122.000	122.025
9 LOCK/ANCHOR HOLE	–	–	–
10 MISALIGNMENT	–	–	0.020
11 COIL SET	–	–	0.508
12 FULL PLATING TO BE NiPd WITH Au;Ni:0.5–2.0um, Pd:0.02–0.15um,Au:0.005–0.015um			
13 TAPE WIDTH TOL. (Hitachi RT321)	31.500	32.000	32.500
14 MAXIMUM RADIUS ON ALL CORNERS UNLESS OTHERWISE SPECIFIED	–	–	0.150
15 VERTICAL BURR	–	–	0.025
16 HORIZONTAL BURR	–	–	0.051
17 LEAD TIP PLANARITY FROM DAM BAR	–	±0.102	–
18 PAD FLATNESS	–	–	0.010
19 CAMBER	–	–	0.076
20 PAD TILT	–	–	0.050/2.540
21 PAD PLANARITY	–	±0.050	–
22 CROSS BOW	–	–	0.500
23 LEAD TWIST	–	–	2.500*
24 FRAME TWIST	–	–	0.635
25 PART TO BE FREE OF RUST, KINKS, BENDS, WRINKLES, OR SCRATCHES DEEPER THAN 0.008			
26 INTERNAL LEAD TIP DIMENSIONS GIVEN ARE GIVEN VALUES			
27 DIMENSION QUADRANT IS TYPICAL FOR QUADRANTS, EXCEPT AS SHOWN			
28 STRIP NUMBER TO BE ADDED ON STRIP			