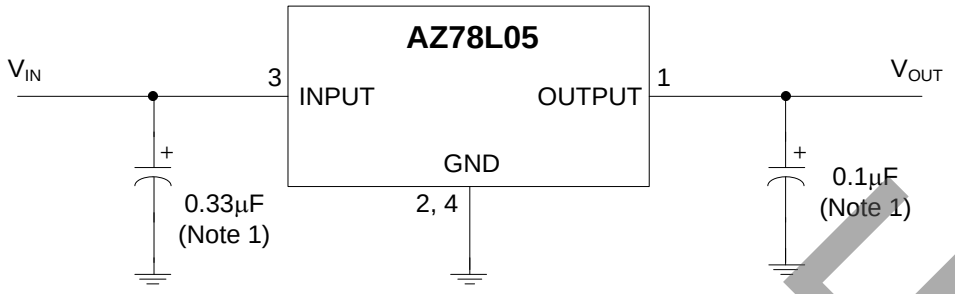
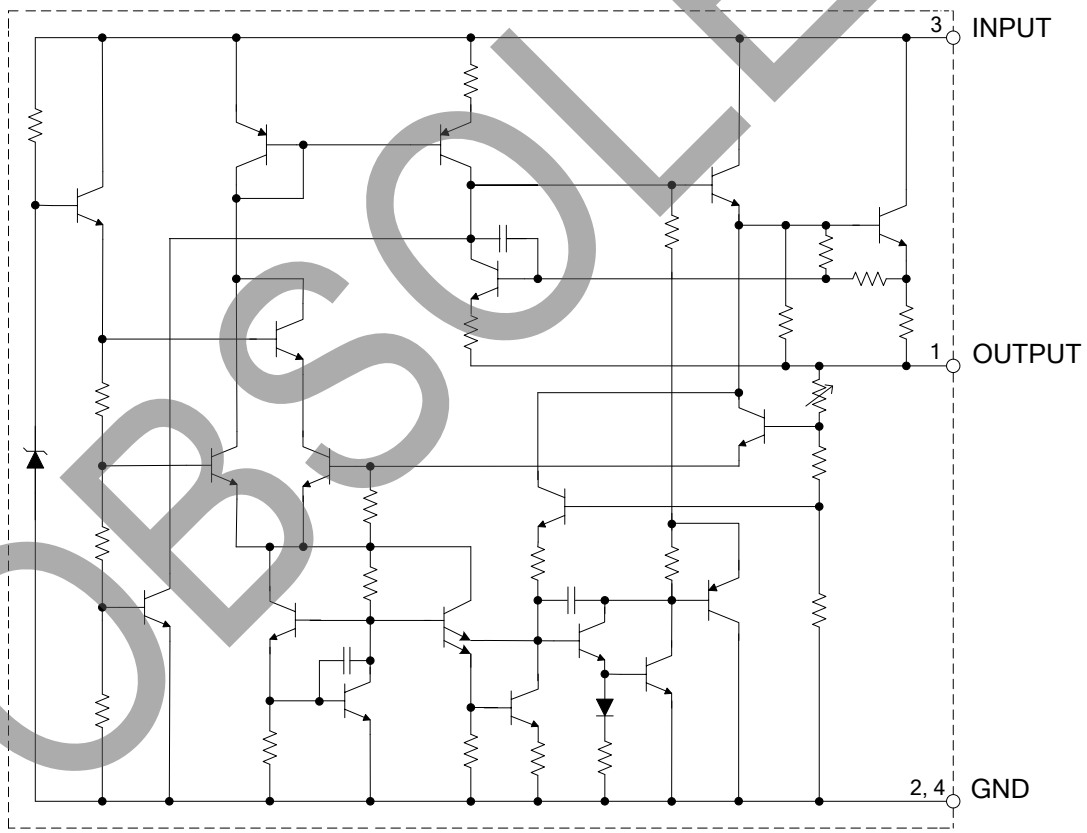
Typical Applications Circuit



Note 1: Bypass capacitors are recommended for optimum stability and stability and transient response and should be located as close as possible to the regulator.

Functional Block Diagram



Absolute Maximum Ratings (Note 2)

Symbol	Parameter	Rating		Unit
V_{IN}	Input Voltage	20		V
T_J	Operating Junction Temperature	+150		°C
T_{LEAD}	Lead Temperature (Soldering, 10sec)	+260		°C
P_D	Power Dissipation (T_A = +25°C)	TO-92	0.65	W
		SOT-223	0.7	
		SOT-89	0.65	
T_{STG}	Storage Temperature Range	-65 to +150		°C
ESD	ESD (Human Body Model)	2000		V
ESD	ESD (Machine Model)	200		V

Note 2: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

Recommended Operating Conditions

Symbol	Parameter		Min	Max	Unit
V_{IN}	Input Voltage	AZ78L05	—	15	V
		AZ78L09	—	18	
T_J	Operating Junction Temperature		-40	+125	°C

Electrical Characteristics

AZ78L05 Electrical Characteristics

(Limits in standard typeface are for T_J = +25°C, **Bold typeface applies over -40°C to +125°C,** I_{OUT} = 40mA, C_{IN} = 0.33µF, C_{OUT} = 0.1µF, V_{IN} = 10V, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	—	4.8	5	5.2	V
		7.0V ≤ V_{IN} ≤ 15V 1.0mA ≤ I_{OUT} ≤ 40mA (Note 3)	**4.75**	—	**5.25**	
V_{RLINE}	Line Regulation	7.0V ≤ V_{IN} ≤ 15V	—	18	75	mV
V_{RLOAD}	Load Regulation	1.0mA ≤ I_{OUT} ≤ 100mA	—	20	60	mV
V_{DROP}	Dropout Voltage	—	—	1.6	—	V
I_{LIMIT}	Current Limit	T_J = +25°C	—	150	—	mA
I_Q	Quiescent Current	I_{OUT} = 0	—	3	5	mA
ΔI_Q	Quiescent Current Change	8.0V ≤ V_{IN} ≤ 15V	—	—	**1.0**	mA
		1.0mA ≤ I_{OUT} ≤ 40mA	—	—	**0.1**	
N_O	Output Noise Voltage	10Hz ≤ f ≤ 100kHz (Note 4)	—	40	—	µV
PSRR	Ripple Rejection	f = 120Hz, 8.0V ≤ V_{IN} ≤ 15V	47	62	—	dB
I_{PK}	Peak Output Current	—	—	150	—	mA
$\Delta V_{OUT}/\Delta T$	Average Temperature Coefficient of Output Voltage	I_{OUT} = 5.0mA	—	0.65	—	mV/°C
V_{IN} (Min)	Minimum Value of Input Voltage Required to Maintain Line Regulation	—	—	6.7	7	V
θ_{JC}	Thermal Resistance	TO-92	—	81	—	°C/W
		SOT-89	—	29.8	—	
		SOT-223	—	71	—	

Notes: 3. Power Dissipation ≤ 0.6W.
4. Recommended minimum load capacitance of 0.01µF to limit high frequency noise.

Electrical Characteristics (continued)

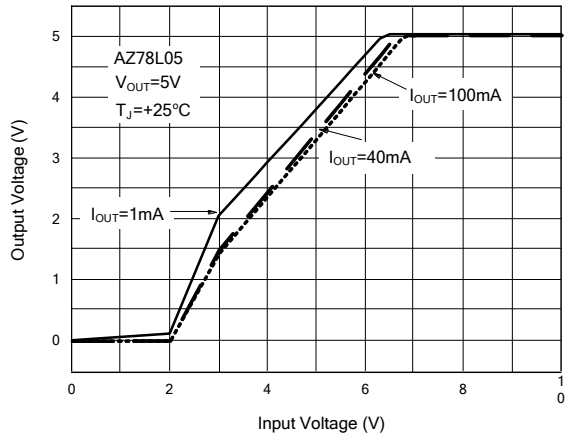
AZ78L09 Electrical Characteristics (Limits in standard typeface are for T_J = +25°C, **Bold typeface applies over -40°C to +125°C,** I_{OUT} = 40mA, C_{IN} = 0.33µF, C_{OUT} = 0.1µF, V_{IN} = 15V, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	—	8.6	9	9.4	V
		12V ≤ V_{IN} ≤ 18V 1.0mA ≤ I_{OUT} ≤ 40mA (Note 3)	**8.55**	—	**9.45**	
V_{RLINE}	Line Regulation	12V ≤ V_{IN} ≤ 18V	—	18	75	mV
V_{RLOAD}	Load Regulation	1.0mA ≤ I_{OUT} ≤ 100mA	—	20	90	mV
V_{DROP}	Dropout Voltage	—	—	1.6	—	V
I_{LIMIT}	Current Limit	T_J = +25°C	—	150	—	mA
I_Q	Quiescent Current	I_{OUT} = 0	—	3	5	mA
ΔI_Q	Quiescent Current Change	12V ≤ V_{IN} ≤ 18V	—	—	**1.5**	mA
		1.0mA ≤ I_{OUT} ≤ 40mA	—	—	**0.1**	
N_O	Output Noise Voltage	10Hz ≤ f ≤ 100kHz (Note 4)	—	70	—	µV
PSRR	Ripple Rejection	f = 120Hz, 12V ≤ V_{IN} ≤ 18V	38	44	—	dB
I_{PK}	Peak Output Current	—	—	150	—	mA
$\Delta V_{OUT}/\Delta T$	Average Temperature Coefficient of Output Voltage	I_{OUT} = 5.0mA	—	0.9	—	mV/°C
V_{IN} (Min)	Minimum Value of Input Voltage Required to Maintain Line Regulation	—	—	10.7	—	V
θ_{JC}	Thermal Resistance	TO-92	—	81	—	°C/W
		SOT-89	—	84	—	
		SOT-223	—	71	—	

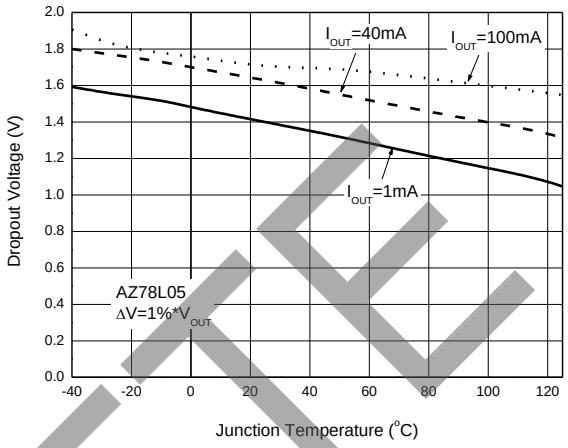
Notes: 3. Power Dissipation ≤ 0.6W.
4. Recommended minimum load capacitance of 0.01µF to limit high frequency noise.

Performance Characteristics

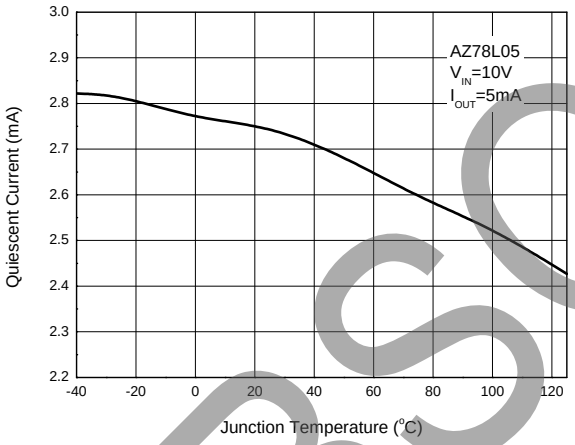
Dropout Characteristics



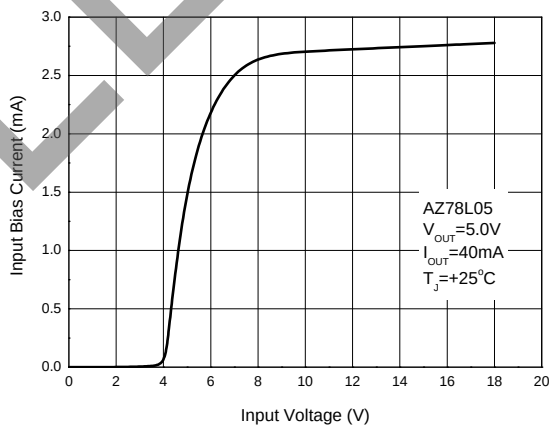
Dropout Voltage vs. Junction Temperature



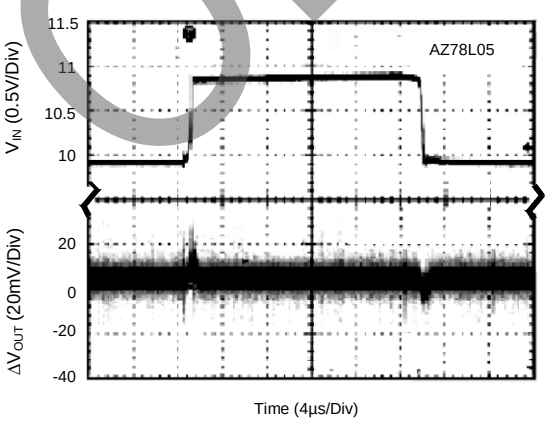
Quiescent Current vs. Junction Temperature



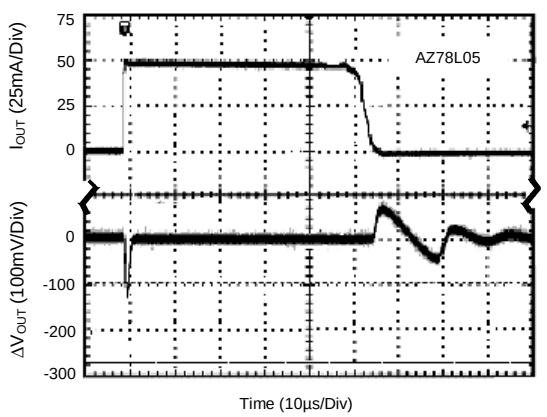
Input Bias Current vs. Input Voltage



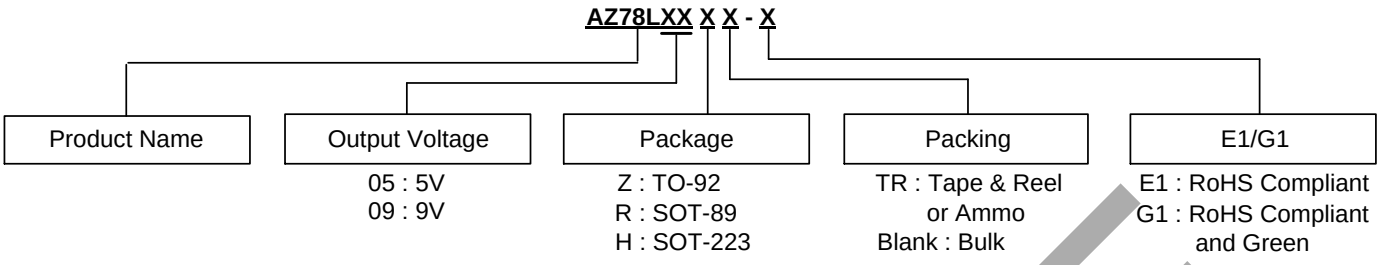
Line Transient Response
(Conditions: V_{IN}=10 to 11V, V_{OUT}=5V, I_{OUT}=40mA)



Load Transient Response
(Conditions: V_{IN}=10V, V_{OUT}=5V, I_{OUT}=1 to 50mA)



Ordering Information

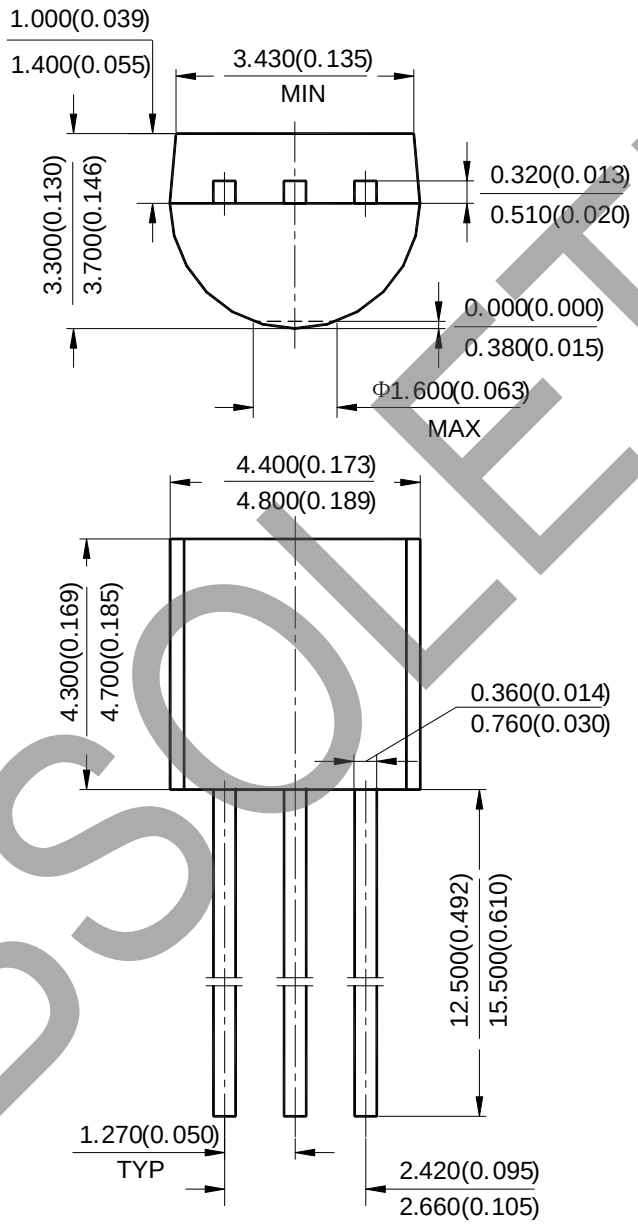


Package	Temperature Range	Part Number	Marking ID	Packing
TO-92	-40 to +125°C	AZ78L05Z-E1	AZ78L05Z-E1	Bulk
		AZ78L05Z-G1	AZ78L05Z-G1	Bulk
		AZ78L05ZTR-E1	AZ78L05Z-E1	Ammo
		AZ78L05ZTR-G1	AZ78L05Z-G1	Ammo
		AZ78L09Z-E1	AZ78L09Z-E1	Bulk
		AZ78L09Z-G1	AZ78L09Z-G1	Bulk
		AZ78L09ZTR-E1	AZ78L09Z-E1	Ammo
		AZ78L09ZTR-G1	AZ78L09Z-G1	Ammo
SOT-89	-40 to +125°C	AZ78L05RTR-E1	E78A	Tape & Reel
		AZ78L05RTR-G1	G78A	Tape & Reel
		AZ78L09RTR-E1	E78C	Tape & Reel
		AZ78L09RTR-G1	G78C	Tape & Reel
SOT-223	-40 to +125°C	AZ78L05HTR-E1	EH78A	Tape & Reel
		AZ78L05HTR-G1	GH78A	Tape & Reel
		AZ78L09HTR-E1	EH78C	Tape & Reel
		AZ78L09HTR-G1	GH78C	Tape & Reel

Package Outline Dimensions (All dimensions in mm(inch).)

Please see http://www.diodes.com/package-outlines.html for the latest version.

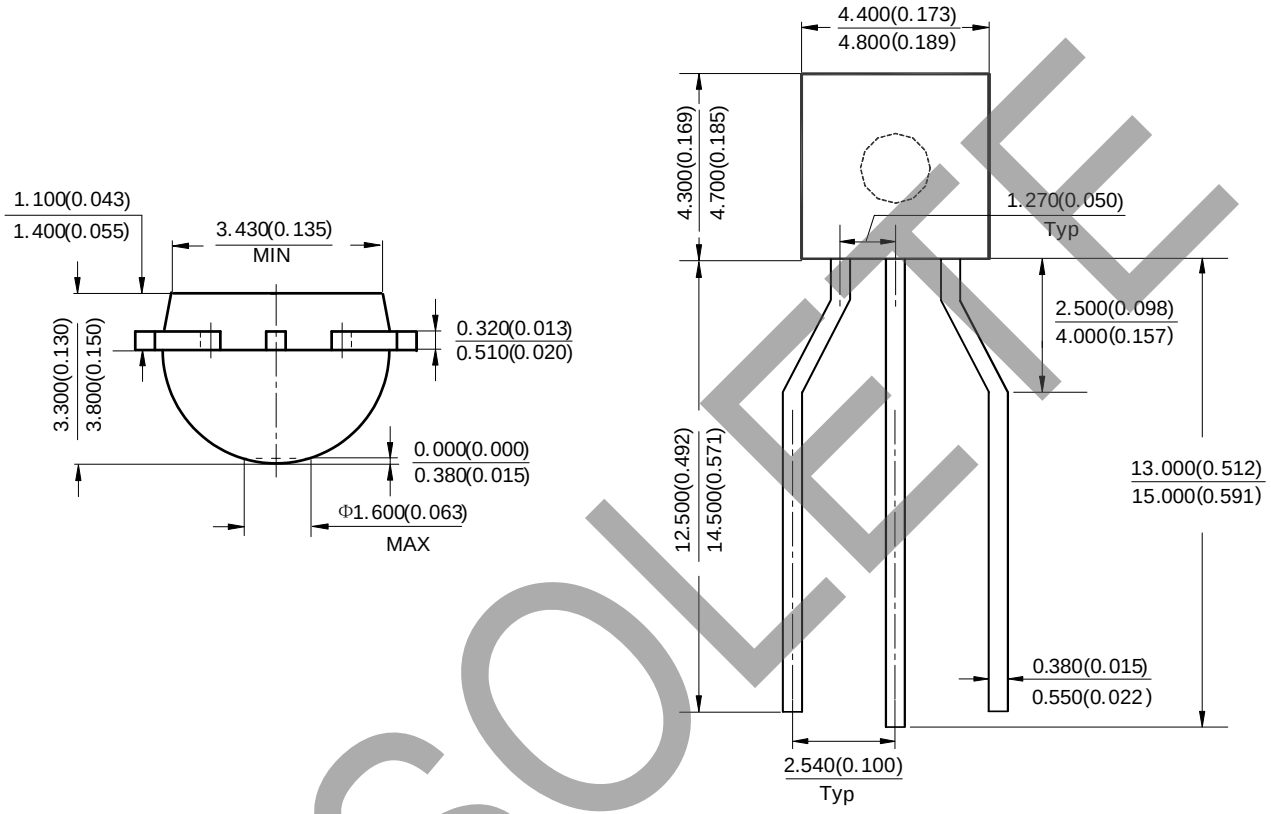
(1) Package Type: TO-92 (Bulk Packing)



Package Outline Dimensions (continued) (All dimensions in mm(inch).)

Please see http://www.diodes.com/package-outlines.html for the latest version.

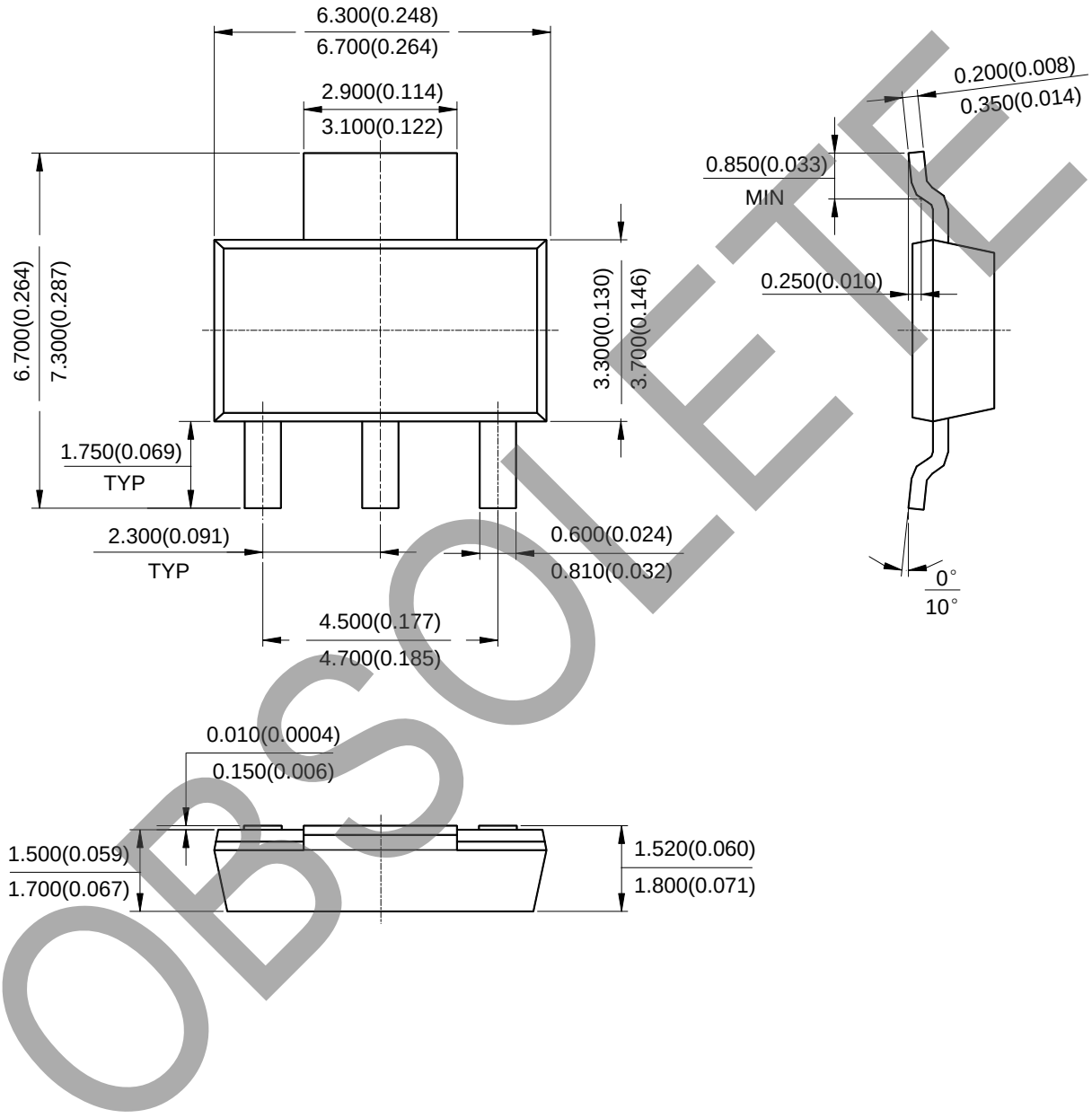
(2) Package Type: TO-92 (Ammo Packing)



Package Outline Dimensions (continued) (All dimensions in mm(inch).)

Please see http://www.diodes.com/package-outlines.html for the latest version.

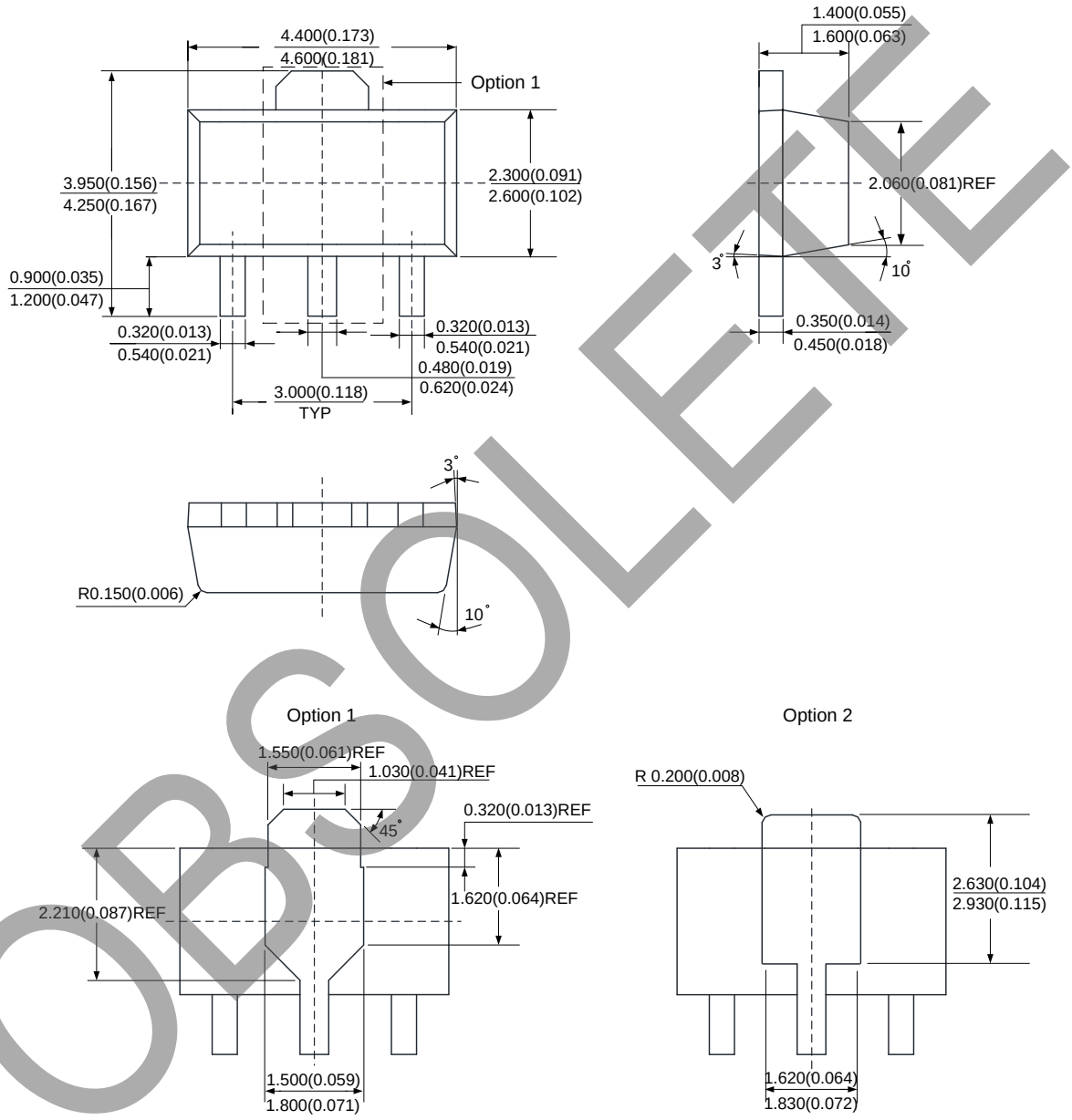
(3) Package Type: SOT-223



Package Outline Dimensions (continued) (All dimensions in mm(inch).)

Please see http://www.diodes.com/package-outlines.html for the latest version.

(4) Package Type: SOT-89



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