

Description

The GS78LXX series are three terminal positive regulators designed for a wide variety of applications including local, on-card regulation.

This series of regulators are complete with internal current limiting, thermal shutdown protection, and safe-area compensation which make them virtually immune from output overload. If adequate heat sinking are provided, these regulators can deliver output currents up to 150mA.

The GS78LXX series are available in TO-92 (bulk or ammo packing), SOT-89 and SOIC-8 packages.

Features

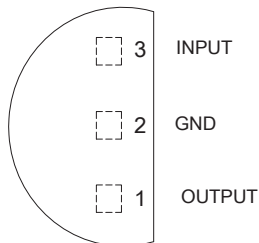
- Output Current up to 150mA
- Fixed Output Voltages of 5V, 12V and 15V
- Output Voltage Accuracy of $\pm 1\%$ over the Full Temperature Range
- Internal Short Circuit Current Limiting
- Internal Thermal Overload Protection
- No External Components
- Output Transistor Safe-Area Protection

Applications

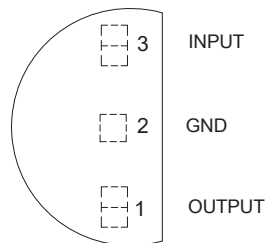
- Consumer Electronics
- Microprocessor Power Supplies
- Mother Boards

Pin Assignments

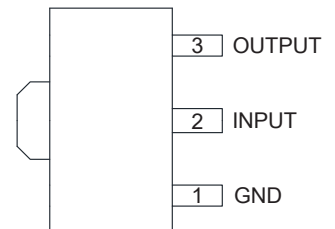
Z Package
(TO-92(Bulk Packing))



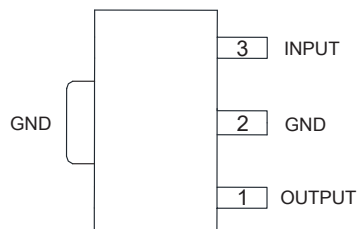
Z Package
(TO-92(Ammo Packing))



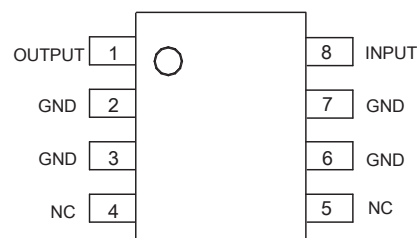
R Package
(SOT-89 Option A)



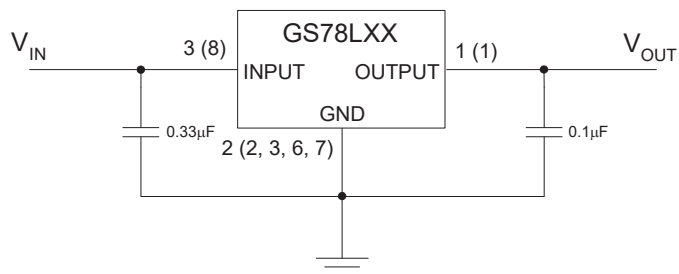
R Package
(SOT-89 Option B)



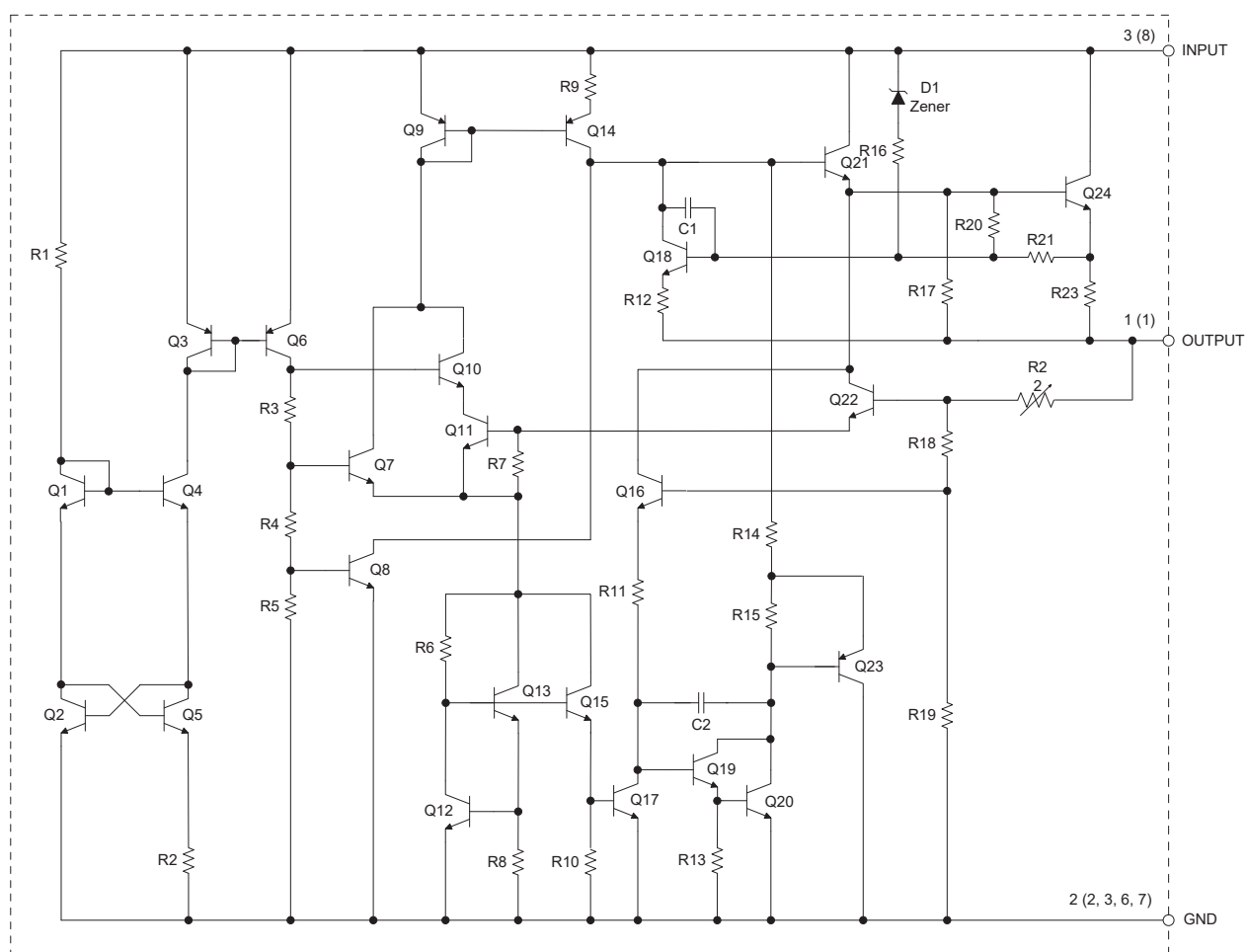
M Package
(SOIC-8)



Typical Applications Circuit



Functional Block Diagram



Absolute Maximum Ratings (Note 1)

Symbol	Parameter	Rating	Unit
V_{IN}	Input Voltage	36	V
T_J	Operating Junction Temperature	150	°C
T_{LEAD}	Lead Temperature (Soldering, 10sec)	260	°C
P_D	Power Dissipation	750	mW
T_{STG}	Storage Temperature Range	-65 to +150	°C
θ_{JA}	Thermal Resistance	TO-92 +180	°C/W
ESD	ESD (Human Body Model)	2000	V
ESD	ESD (Machine Model)	200	V

Note. 1. 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.

Electrical Characteristics

GS78L05 (@ $V_{IN} = 10V$, $I_{OUT} = 40mA$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1\mu F$, $T_J = +25^\circ C$, **Bold** typeface applies over $-40^\circ C \leq T_J \leq +125^\circ C$, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage		4.94	5.0	5.05	V
V_{RLINE}	Line Regulation	$7V \leq V_{IN} \leq 20V$		8	150	mV
V_{RLOAD}	Load Regulation	$1mA \leq I_{OUT} \leq 100mA$		10	60	mV
I_Q	Quiescent Current			3	5.5	mA
ΔI_Q	Quiescent Current Change	$8V \leq V_{IN} \leq 20V$			1.5	mA
		$1mA \leq I_{OUT} \leq 40mA$			0.1	
PSRR	Ripple Rejection	$f = 120Hz$, $8V \leq V_{IN} \leq 18V$	47	62		dB
V_{DROP}	Dropout Voltage	$I_{OUT} = 40mA$		1.7	2.0	V
		$I_{OUT} = 100mA$		1.8	2.3	
N_O	Output Noise Voltage	$10Hz \leq f \leq 100kHz$ (Note 2)		40		μV
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	$I_{OUT} = 5mA$		0.42		mV/°C
$(\Delta V_{OUT}/V_{OUT})/\square \Delta T$				84		ppm/°C
θ_{JC}	Thermal Resistance	TO-92		200		°C/W
		SOT-89		165		
		SOIC-8		180		

Note: 2. 0.01 μF minimum load capacitance is recommended to limit high frequency noise.

Electrical Characteristics (cont.)

GS78L05C (@ $V_{IN} = 10V$, $I_{OUT} = 40mA$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1\mu F$, $T_J = +25^\circ C$, **Bold** typeface applies over $-40^\circ C \leq T_J \leq +125^\circ C$, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage		5.0		5.1	V
V_{RLINE}	Line Regulation	$7V \leq V_{IN} \leq 20V$		8	150	mV
V_{RLOAD}	Load Regulation	$1mA \leq I_{OUT} \leq 100mA$		10	60	mV
I_Q	Quiescent Current			3	5.5	mA
ΔI_Q	Quiescent Current Change	$8V \leq V_{IN} \leq 20V$			1.5	mA
		$1mA \leq I_{OUT} \leq 40mA$			0.1	
PSRR	Ripple Rejection	$F = 120Hz$, $8V \leq V_{IN} \leq 18V$	47	62		dB
V_{DROP}	Dropout Voltage	$I_{OUT} = 40mA$		1.7		V
		$I_{OUT} = 100mA$		1.8		
N_O	Output Noise Voltage	$10Hz \leq f \leq 100kHz$ (Note 2)		40		μV
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	$I_{OUT} = 5mA$		0.42		mV/ $^\circ C$
$(\Delta V_{OUT}/V_{OUT})/\square \Delta T$				84		ppm/ $^\circ C$
θ_{JC}	Thermal Resistance	TO-92		200		$^\circ C/W$
		SOT-89		165		
		SOIC-8		180		

Note: 2. 0.01 μF minimum load capacitance is recommended to limit high frequency noise.

Electrical Characteristics (cont.)

GS78L12 (@ $V_{IN} = 19V$, $I_{OUT} = 40mA$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1\mu F$, $T_J = +25^\circ C$, **Bold** typeface applies over $-40^\circ C \leq T_J \leq +125^\circ C$, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage		11.5	12.0	12.5	V
		$14.5V \leq V_{IN} \leq 27V$, $1mA \leq I_{OUT} \leq 100mA$, $P_D \leq 0.75W$	11.4		12.6	
V_{RLINE}	Line Regulation	$14.5V \leq V_{IN} \leq 27V$		20	250	mV
V_{RLOAD}	Load Regulation	$1mA \leq I_{OUT} \leq 100mA$		20	100	mV
I_Q	Quiescent Current			3	6	mA
ΔI_Q	Quiescent Current Change	$16V \leq V_{IN} \leq 27V$			1.5	mA
		$1mA \leq I_{OUT} \leq 40mA$			0.1	
PSRR	Ripple Rejection	$f = 120Hz$, $15V \leq V_{IN} \leq 25V$	37	42		dB
V_{DROP}	Dropout Voltage	$I_{OUT} = 40mA$		1.7		V
		$I_{OUT} = 100mA$		1.8		
N_O	Output Noise Voltage	$10Hz \leq f \leq 100kHz$ (Note 2)		80		μV
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	$I_{OUT} = 5mA$		1		mV/ $^\circ C$
$(\Delta V_{OUT}/V_{OUT})/\square \Delta T$				84		ppm/ $^\circ C$
θ_{JC}	Thermal Resistance	TO-92		200		$^\circ C/W$
		SOT-89		165		
		SOIC-8		180		

Note: 2. 0.01 μF minimum load capacitance is recommended to limit high frequency noise.

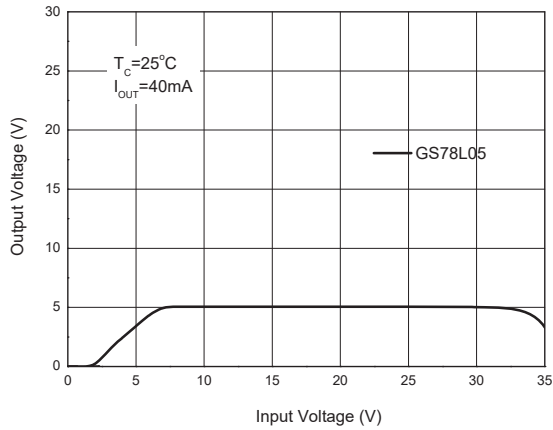
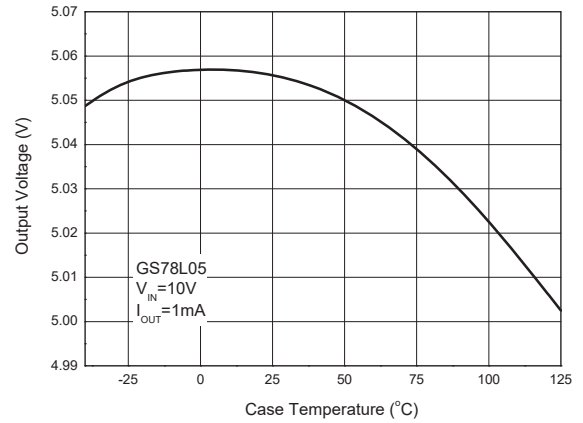
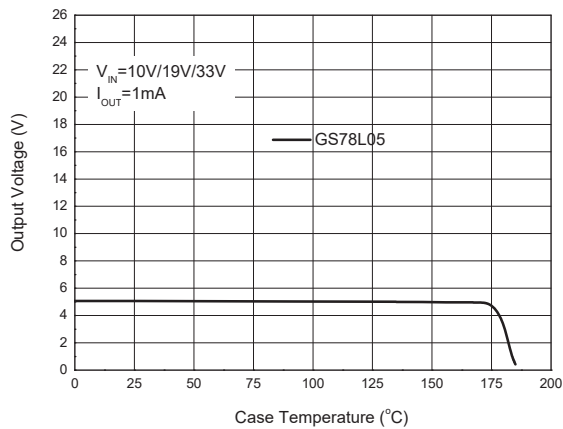
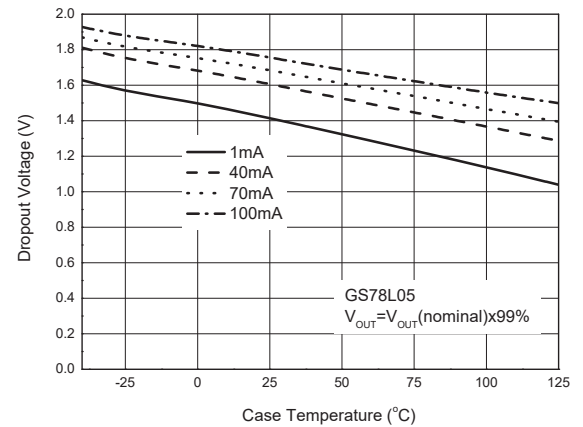
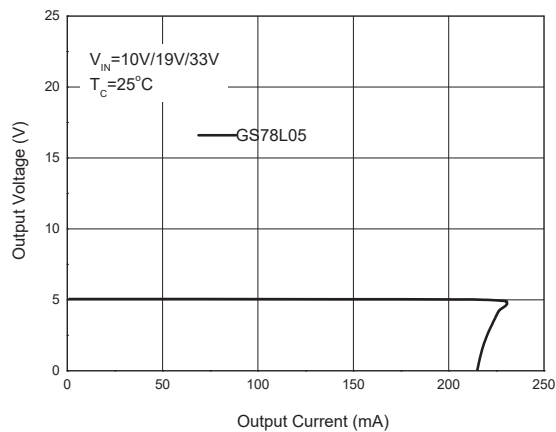
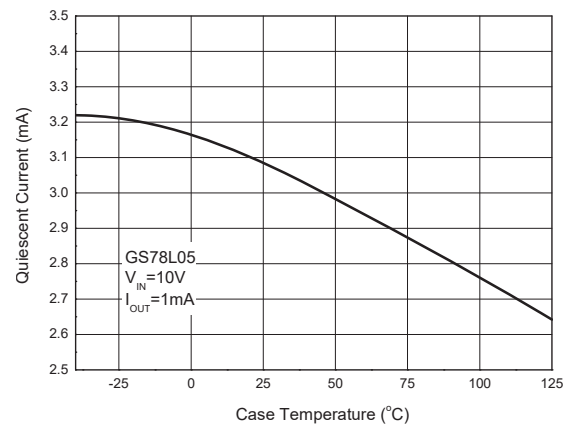
Electrical Characteristics (cont.)

GS78L15 (@ $V_{IN} = 23V$, $I_{OUT} = 40mA$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1\mu F$, $T_J = +25^\circ C$, **Bold** typeface applies over $-40^\circ C \leq T_J \leq +125^\circ C$, unless otherwise specified.)

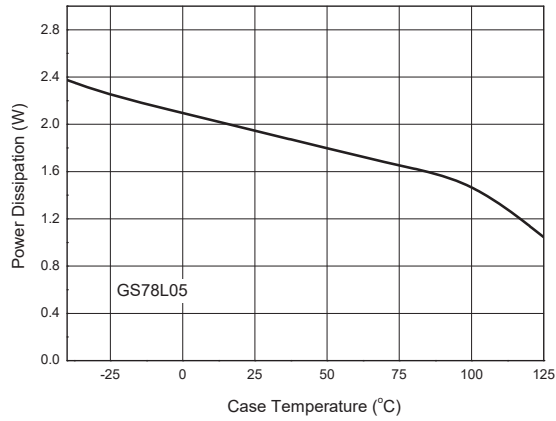
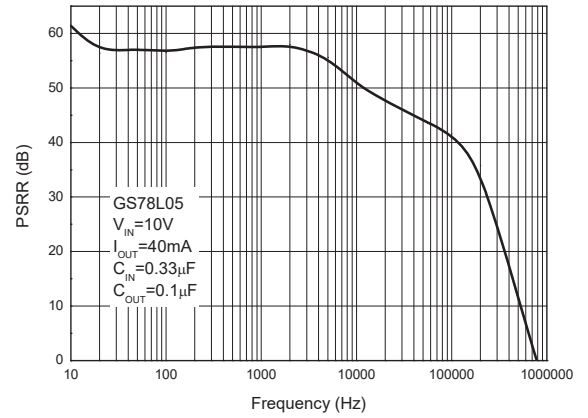
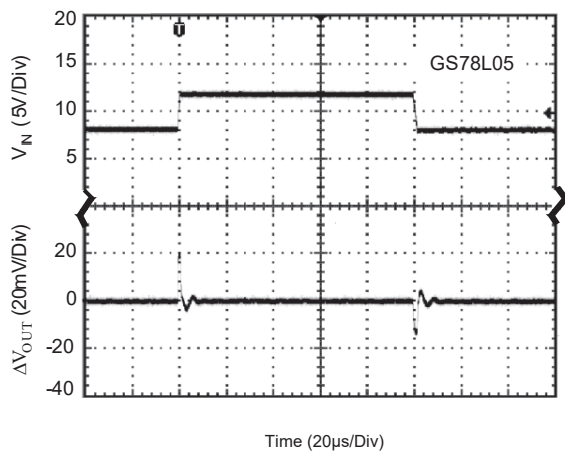
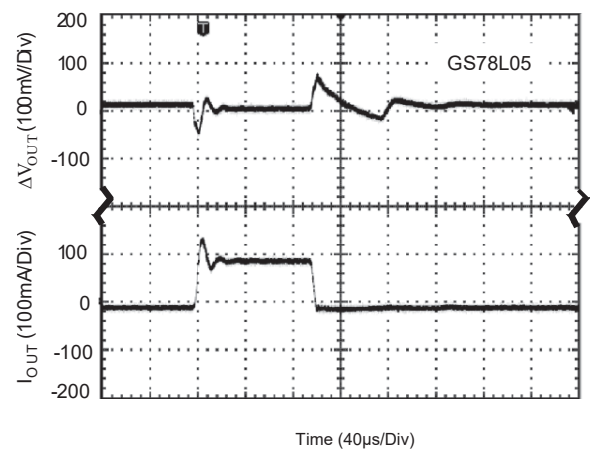
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage		14.4	15.0	15.6	V
		$17.5V \leq V_{IN} \leq 30V$, $1mA \leq I_{OUT} \leq 100mA$, $P_D \leq 0.75W$	14.25		15.75	
V_{RLINE}	Line Regulation	$17.5V \leq V_{IN} \leq 30V$		25	250	mV
V_{RLOAD}	Load Regulation	$1mA \leq I_{OUT} \leq 100mA$		25	150	mV
I_Q	Quiescent Current			3	6	mA
ΔI_Q	Quiescent Current Change	$20V \leq V_{IN} \leq 30V$			1.5	mA
		$1mA \leq I_{OUT} \leq 40mA$			0.1	
PSRR	Ripple Rejection	$f = 120Hz$, $18.5V \leq V_{IN} \leq 28.5V$	34	39		dB
V_{DROP}	Dropout Voltage	$I_{OUT} = 40mA$		1.7		V
		$I_{OUT} = 100mA$		1.8		
N_O	Output Noise Voltage	$10Hz \leq f \leq 100kHz$ (Note 2)		90		μV
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	$I_{OUT} = 5mA$		1.25		mV/ $^\circ C$
$(\Delta V_{OUT}/V_{OUT})/\square \Delta T$				84		ppm/ $^\circ C$
θ_{JC}	Thermal Resistance	TO-92		200		$^\circ C/W$
		SOT-89		165		
		SOIC-8		180		

Note: 2. 0.01 μF minimum load capacitance is recommended to limit high frequency noise.

Performance Characteristics

Output Voltage vs. Input Voltage

Output Voltage vs. Case Temperature

Over Temperature Protection

Dropout Voltage vs. Case Temperature

Output Voltage vs. Output Current

Quiescent Current vs. Case Temperature


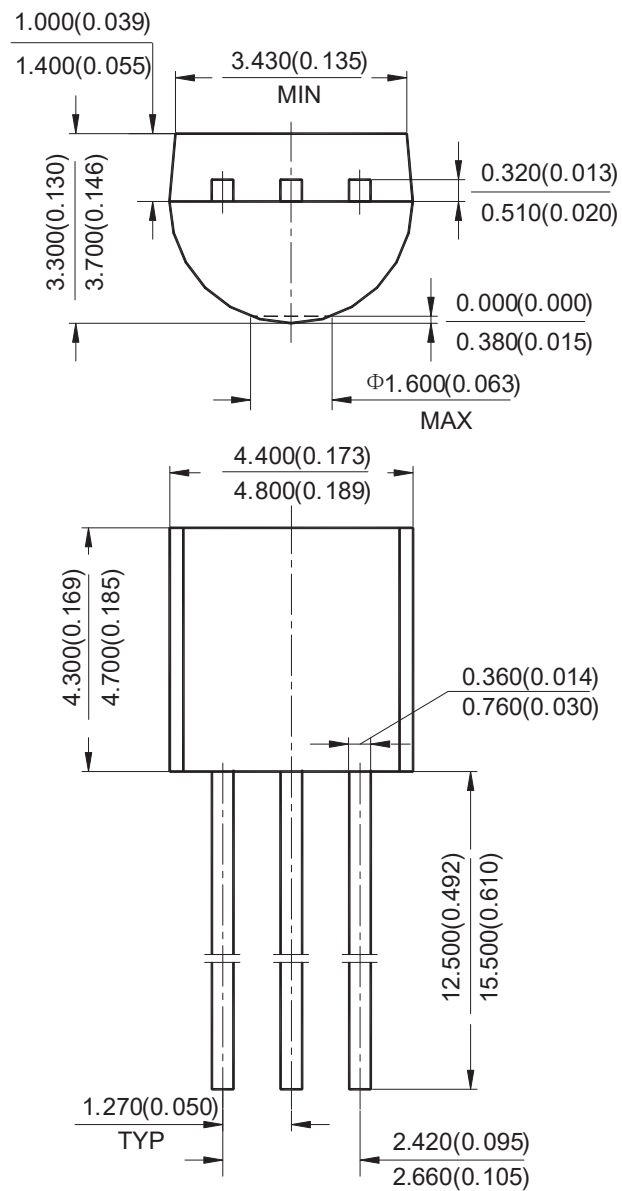
Performance Characteristics (cont.)

Power Dissipation vs. Case Temperature

PSRR vs. Frequency

Line Transient
 (Conditions: $I_{OUT}=40mA$, $C_{IN}=0.33\mu F$, $C_{OUT}=0.1\mu F$)

Load Transient
 (Conditions: $V_{IN}=10V$, $C_{IN}=0.33\mu F$, $C_{OUT}=0.1\mu F$)


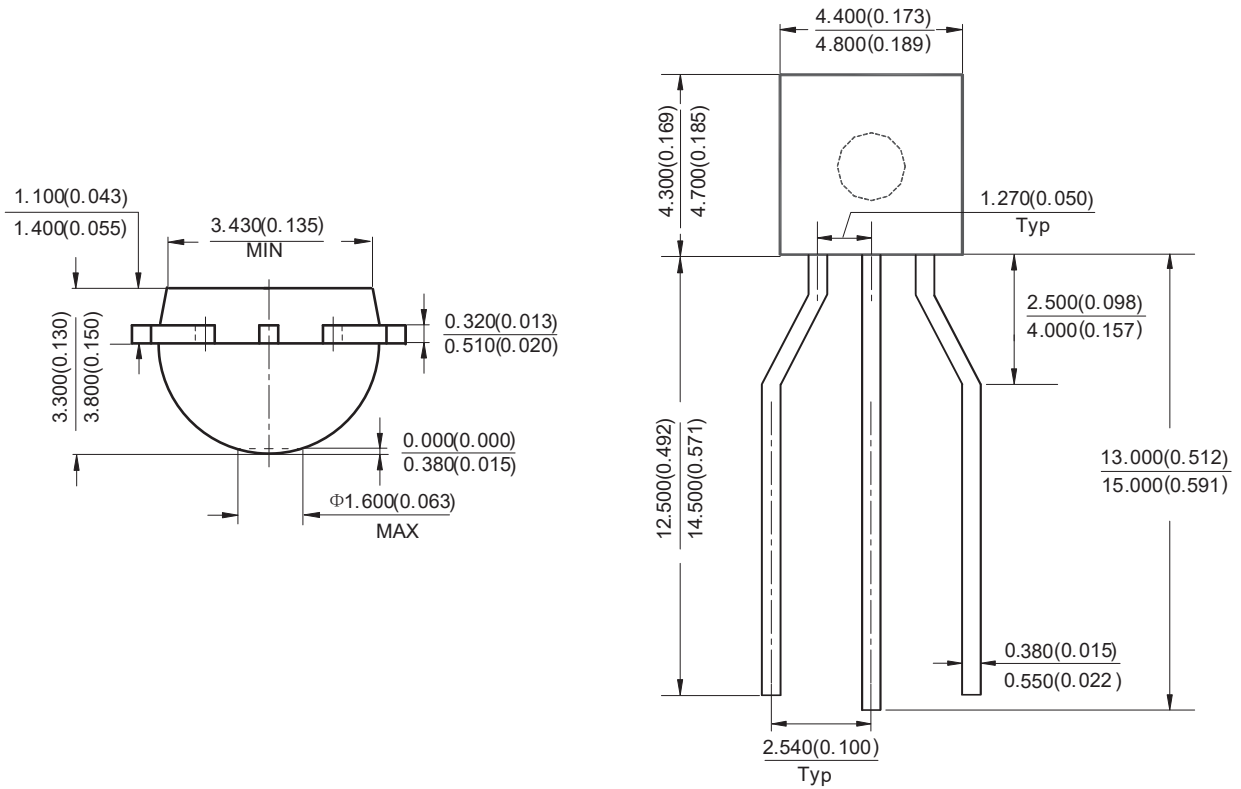
Ordering Information

Model	PIN-PACKAGE	Ordering Number	Packing Option
GS78LXX	SOT89-3A	GS78LXX-STR3	3000pcs/Reel
	SOT89-3B	GS78LXXY-STR3	3000pcs/Reel
	TO92	GS78LXX-OTR2	3000pcs/Reel
	SOP-8	GS78LXX-SR	4000pcs/Reel

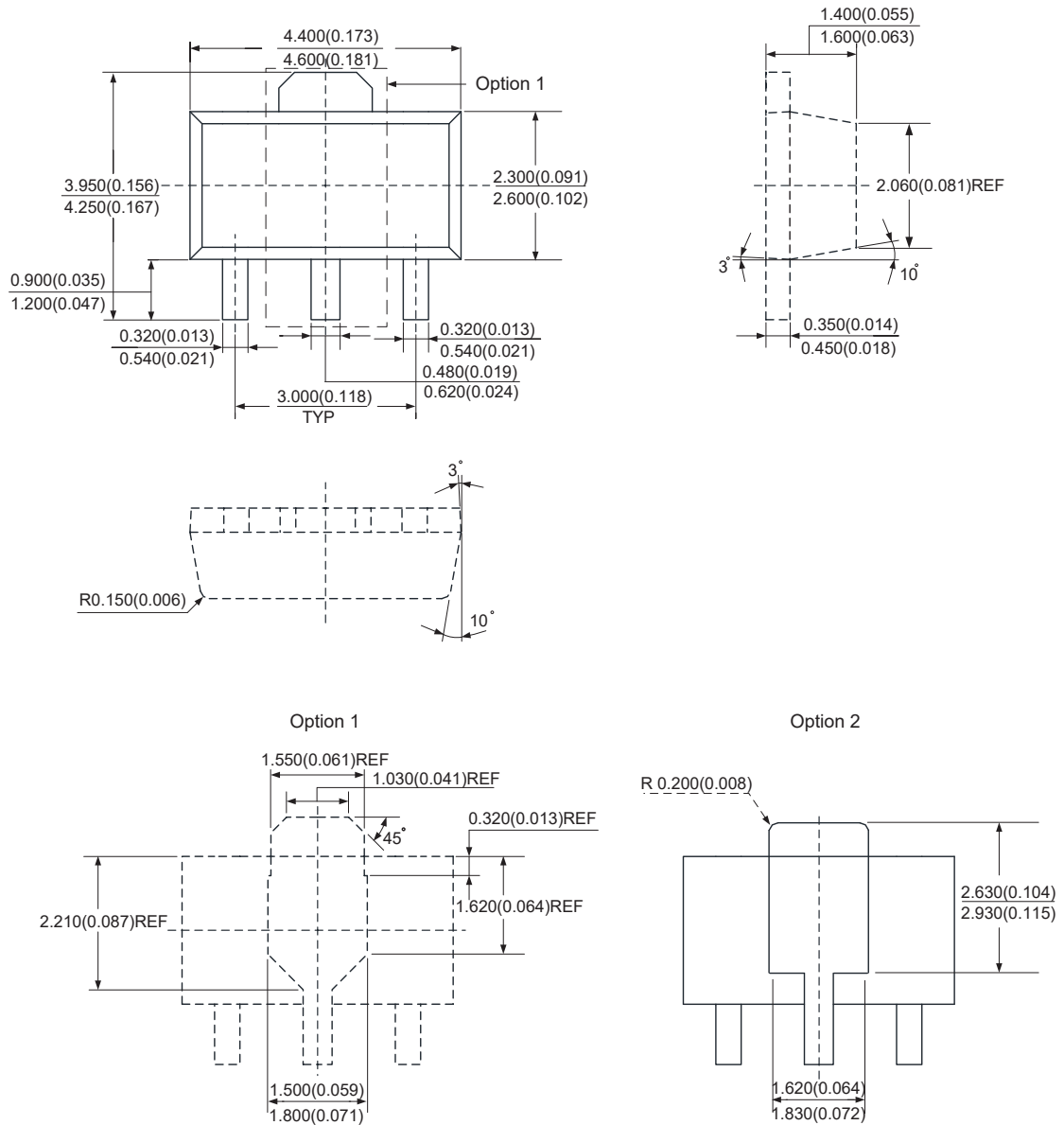
Package Outline Dimensions (All dimensions in mm(inch).)

TO-92 (Bulk Packing)


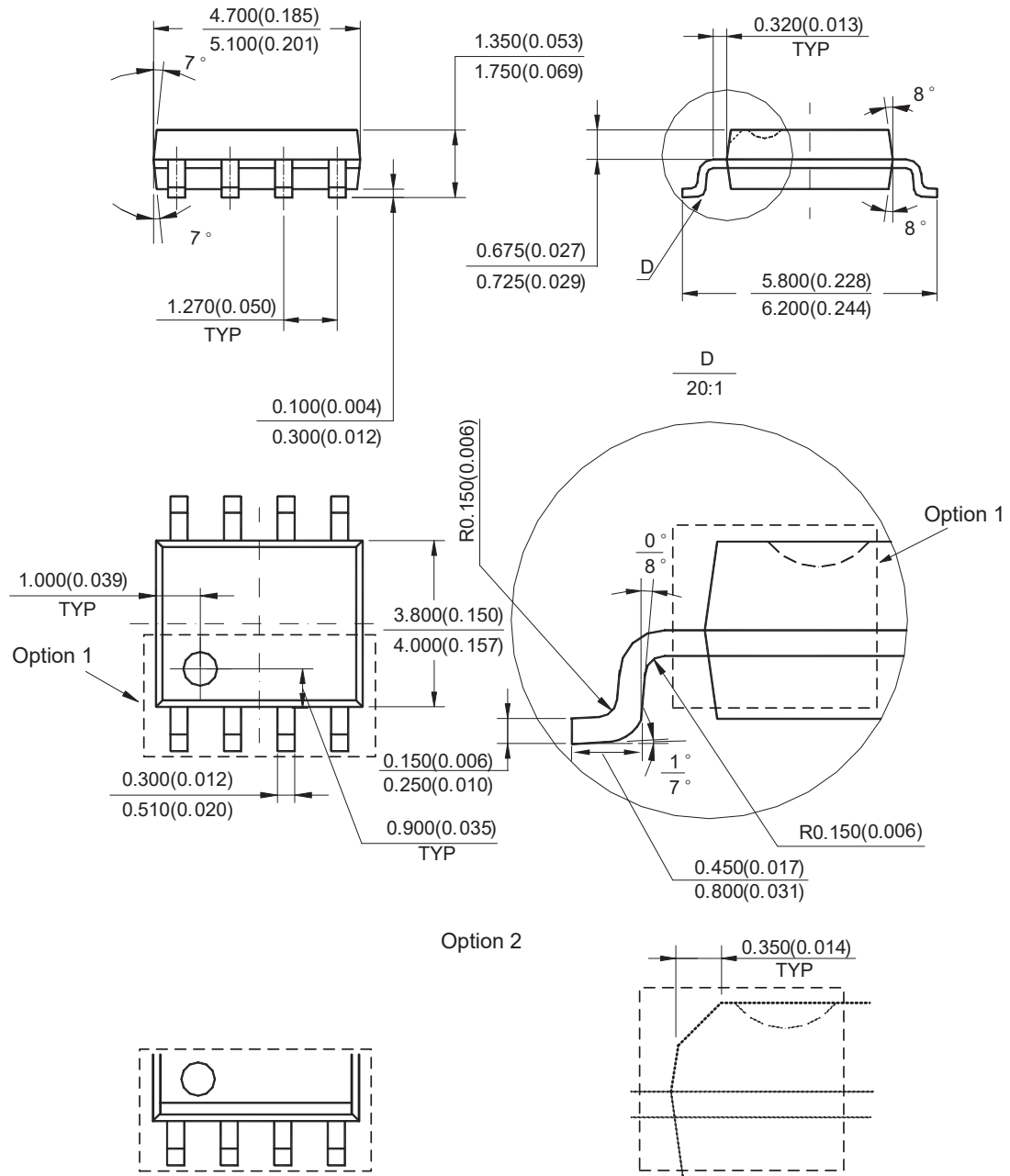
Package Outline Dimensions (cont.) (All dimensions in mm(inch).)

TO-92 (Ammo Packing)


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

SOT-89


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

SOIC-8


Note: Eject hole, oriented hole and mold mark is optional.