Description

The GM6250's combine high accuracy with very low power consumption, providing high output current even when the application requires extremely low input-output voltage differential.

The GM6250's include a precision voltage reference, an error correction circuit, over-temperature protection, and a current limited output driver. Fast transient response to load variations provides excellent stability under dynamic load conditions.

The GM6250's come in SOT-23 (150mW), SOT-89 (500mW) and TO-92 packages.

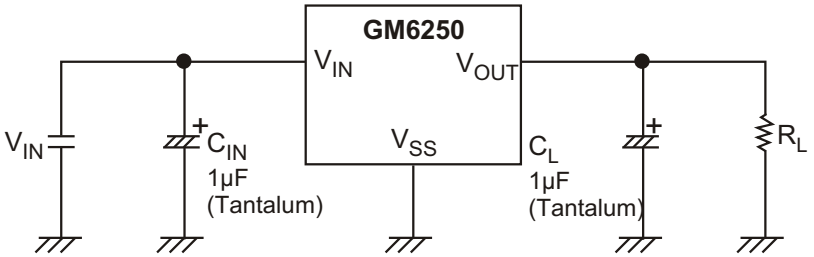
Features

- **Maximum output current 250mA (within maximum power dissipation)**
- **Output voltage: from 1.8 V to 6.0V in 0.1V increments**
- **Output voltage ±2%**
- **CMOS low power consumption, typically 1.0μA at V_{OUT} = 5.0V**
- **Input stability typically 0.2%/ V**
- **Ultra-low dropout voltage 0.38V @ I_{OUT} = 200mA at V_{OUT} = 5.0V**
- **Small input/ output differential: 0.4V at 160mA (V_{OUT} = 3.3V)**
- **SOT-23 (150mW), SOT-89 (500mW) and TO-92 packages**

Application

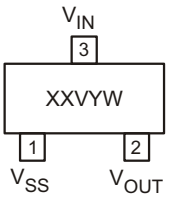
Palmtops
Portable Cameras
Video Recorders
Battery Powered Equipment
Reference Voltage Sources

TYPICAL APPLICATION CIRCUITS

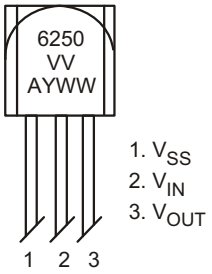


◆ MARKING INFORMATION & PIN CONFIGURATIONS (TOP VIEW)

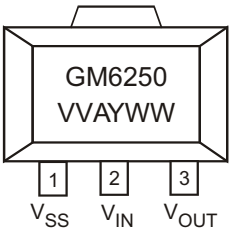
SOT-23



TO-92



SOT-89



XX = Specific Device Code(EA = GM6250)
V = Voltage Code
VV = Voltage Suffix (18=1.8V, 50=5.0V)
A = Assembly Location
Y = Year
WW, W= Work Week

◆ ORDERING INFORMATION (Continued)

Ordering Number	Output Voltage	Voltage Code	Package	Shipping
GM6250-1.5T92B	1.5V		TO-92	1,000 Units/ ESD Bag
GM6250-1.5T92RL	1.5V		TO-92	2,000 Units/ Ammo Pack (Tape)
GM6250-1.5ST23R	1.5V	C	SOT-23	3,000 Units/ Tape and Reel
GM6250-1.5ST89R	1.5V		SOT-89	1,000 Units/ Tape and Reel
GM6250-1.8T92B	1.8V		TO-92	1,000 Units/ ESD Bag
GM6250-1.8T92RL	1.8V		TO-92	2,000 Units/ Ammo Pack (Tape)
GM6250-1.8ST23R	1.8V	E	SOT-23	3,000 Units/ Tape and Reel
GM6250-1.8ST89R	1.8V		SOT-89	1,000 Units/ Tape and Reel
GM6250-2.5T92B	2.5V		TO-92	1,000 Units/ ESD Bag
GM6250-2.5T92RL	2.5V		TO-92	2,000 Units/ Ammo Pack (Tape)
GM6250-2.5ST23R	2.5V	G	SOT-23	3,000 Units/ Tape and Reel
GM6250-2.5ST89R	2.5V		SOT-89	1,000 Units/ Tape and Reel
GM6250-2.7T92B	2.7V		TO-92	1,000 Units/ ESD Bag
GM6250-2.7T92RL	2.7V		TO-92	2,000 Units/ Ammo Pack (Tape)
GM6250-2.7ST23R	2.7V	T	SOT-23	3,000 Units/ Tape and Reel
GM6250-2.7ST89R	2.7V		SOT-89	1,000 Units/ Tape and Reel
GM6250-2.8T92B	2.8V		TO-92	1,000 Units/ ESD Bag
GM6250-2.8T92RL	2.8V		TO-92	2,000 Units/ Ammo Pack (Tape)
GM6250-2.8ST23R	2.8V	H	SOT-23	3,000 Units/ Tape and Reel
GM6250-2.8ST89R	2.8V		SOT-89	1,000 Units/ Tape and Reel
GM6250-2.85T92B	2.85V		TO-92	1,000 Units/ ESD Bag
GM6250-2.85T92RL	2.85V		TO-92	2,000 Units/ Ammo Pack (Tape)
GM6250-2.85ST23R	2.85V	I	SOT-23	3,000 Units/ Tape and Reel
GM6250-2.85ST89R	2.85V		SOT-89	1,000 Units/ Tape and Reel
GM6250-3.0T92B	3.0V		TO-92	1,000 Units/ ESD Bag
GM6250-3.0T92RL	3.0V		TO-92	2,000 Units/ Ammo Pack (Tape)
GM6250-3.0ST23R	3.0V	J	SOT-23	3,000 Units/ Tape and Reel
GM6250-3.0ST89R	3.0V		SOT-89	1,000 Units/ Tape and Reel

* For detail Ordering Number identification, please see last page.

◆ ORDERING INFORMATION (Continued)

Ordering Number	Output Voltage	Voltage Code	Package	Shipping
GM6250-3.2T92B	3.2V		TO-92	1,000 Units/ ESD Bag
GM6250-3.2T92RL	3.2V		TO-92	2,000 Units/ Ammo Pack (Tape)
GM6250-3.2ST23R	3.2V	U	SOT-23	3,000 Units/ Tape and Reel
GM6250-3.2ST89R	3.2V		SOT-89	1,000 Units/ Tape and Reel
GM6250-3.3T92B	3.3V		TO-92	1,000 Units/ ESD Bag
GM6250-3.3T92RL	3.3V		TO-92	2,000 Units/ Ammo Pack (Tape)
GM6250-3.3ST23R	3.3V	K	SOT-23	3,000 Units/ Tape and Reel
GM6250-3.3ST89R	3.3V		SOT-89	1,000 Units/ Tape and Reel
GM6250-3.5T92B	3.5V		TO-92	1,000 Units/ ESD Bag
GM6250-3.5T92RL	3.5V		TO-92	2,000 Units/ Ammo Pack (Tape)
GM6250-3.5ST23R	3.5V	V	SOT-23	3,000 Units/ Tape and Reel
GM6250-3.5ST89R	3.5V		SOT-89	1,000 Units/ Tape and Reel
GM6250-3.6T92B	3.6V		TO-92	1,000 Units/ ESD Bag
GM6250-3.6T92RL	3.6V		TO-92	2,000 Units/ Ammo Pack (Tape)
GM6250-3.6ST23R	3.6V	L	SOT-23	3,000 Units/ Tape and Reel
GM6250-3.6ST89R	3.6V		SOT-89	1,000 Units/ Tape and Reel
GM6250-4.0T92B	4.0V		TO-92	1,000 Units/ ESD Bag
GM6250-4.0T92RL	4.0V		TO-92	2,000 Units/ Ammo Pack (Tape)
GM6250-4.0ST23R	4.0V	M	SOT-23	3,000 Units/ Tape and Reel
GM6250-4.0ST89R	4.0V		SOT-89	1,000 Units/ Tape and Reel
GM6250-4.4T92B	4.4V		TO-92	1,000 Units/ ESD Bag
GM6250-4.4T92RL	4.4V		TO-92	2,000 Units/ Ammo Pack (Tape)
GM6250-4.4ST23R	4.4V	W	SOT-23	3,000 Units/ Tape and Reel
GM6250-4.4ST89R	4.4V		SOT-89	1,000 Units/ Tape and Reel
GM6250-4.5T92B	4.5V		TO-92	1,000 Units/ ESD Bag
GM6250-4.5T92RL	4.5V		TO-92	2,000 Units/ Ammo Pack (Tape)
GM6250-4.5ST23R	4.5V	N	SOT-23	3,000 Units/ Tape and Reel
GM6250-4.5ST89R	4.5V		SOT-89	1,000 Units/ Tape and Reel
GM6250-5.0T92B	5.0V		TO-92	1,000 Units/ ESD Bag
GM6250-5.0T92RL	5.0V		TO-92	2,000 Units/ Ammo Pack (Tape)
GM6250-5.0ST23R	5.0V	Q	SOT-23	3,000 Units/ Tape and Reel
GM6250-5.0ST89R	5.0V		SOT-89	1,000 Units/ Tape and Reel

* For detail Ordering Number identification, please see last page.

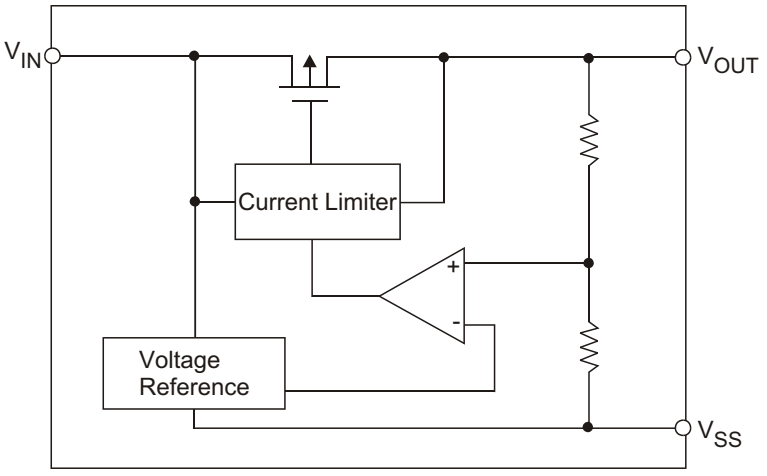
◆ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNITS
Input Voltage		V_{IN}	12	V
Output Current		I_{OUT}	500	mA
Output Voltage		V_{OUT}	V_{SS} - 0.3 ~ V_{IN} + 0.3	V
Continuous Total Power Dissipation	SOT - 23	P_D	150	mW
	SOT - 89		500	
	TO - 92		300	
Operating Ambient Temperature		T_{opr}	-30 ~ +80	°C
Storage Temperature		T_{stg}	-40 ~ +125	°C
Maximum Junction Temperature		T_j	150	°C

◆ Thermal Information

PARAMETER		Maximum	Unit
Thermal Resistance $R_{\theta jc}$	SOT-89	100	°C/ W
Thermal Resistance $R_{\theta ja}$		300	°C/ W

◆ BLOCK DIAGRAM



◆ ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Circuit
Output Voltage	GM6250-1.8V	$V_{OUT}(E)$ (Note 2)	I_{OUT}=40mA, V_{IN} >V_{Drop}+V_{OUT}	1.764	1.800	1.836	V	1
	GM6250-2.5V			2.450	2.500	2.550		
	GM6250-2.7V			2.646	2.700	2.754		
	GM6250-2.8V			2.744	2.800	2.856		
	GM6250-3.0V			2.940	3.000	3.060		
	GM6250-3.2V			3.136	3.200	3.264		
	GM6250-3.3V			3.234	3.300	3.366		
	GM6250-3.5V			3.430	3.500	3.570		
	GM6250-3.6V			3.528	3.600	3.672		
	GM6250-4.0V			3.920	4.000	4.080		
	GM6250-4.4V			4.312	4.400	4.488		
	GM6250-4.5V			4.410	4.500	4.590		
	GM6250-5.0V			4.900	5.000	5.100		
Maximum Output Current	GM6250-1.8V	I_{OUT} max	V_{IN}=3.0V, V_{OUT}(E) ≥1.62V	250			mA	1
	GM6250-2.5V		V_{IN}=4.0V, V_{OUT}(E) ≥ 2.3V					
	GM6250-2.7V		V_{IN}=4.0V, V_{OUT}(E) ≥2.43V					
	GM6250-2.8V		V_{IN}=4.0V, V_{OUT}(E) ≥2.52V					
	GM6250-3.0V		V_{IN}=4.0V, V_{OUT}(E) ≥ 2.7V					
	GM6250-3.2V		V_{IN}=4.0V, V_{OUT}(E) ≥2.88V					
	GM6250-3.3V		V_{IN}=4.0V, V_{OUT}(E) ≥2.97V					
	GM6250-3.5V		V_{IN}=5.0V, V_{OUT}(E) ≥3.15V					
	GM6250-3.6V		V_{IN}=5.0V, V_{OUT}(E) ≥3.24V					
	GM6250-4.0V		V_{IN}=5.0V, V_{OUT}(E) ≥ 3.6V					
	GM6250-4.4V		V_{IN}=6.0V, V_{OUT}(E) ≥3.96V					
	GM6250-4.5V		V_{IN}=6.0V, V_{OUT}(E) ≥4.05V					
	GM6250-5.0V		V_{IN}=6.0V, V_{OUT}(E) ≥ 4.5V					

◆ ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Circuit
Load Stability	GM6250-1.8V	V_{OUT}	V_{IN}=2.8V, 1mA≤ I_{OUT}≤ 60mA		45	90	mV	1
	GM6250-2.5V		V_{IN}=3.5V, 1mA≤ I_{OUT}≤ 80mA		45	90		
	GM6250-2.7V		V_{IN}=3.7V, 1mA≤ I_{OUT}≤ 80mA		45	90		
	GM6250-2.8V		V_{IN}=3.8V, 1mA≤ I_{OUT}≤ 80mA		45	90		
	GM6250-3.0V		V_{IN}=4.0V, 1mA≤ I_{OUT}≤ 80mA		45	90		
	GM6250-3.2V		V_{IN}=4.2V, 1mA≤ I_{OUT}≤ 80mA		45	90		
	GM6250-3.3V		V_{IN}=4.3V, 1mA≤ I_{OUT}≤ 100mA		45	90		
	GM6250-3.5V		V_{IN}=4.5V, 1mA≤ I_{OUT}≤ 100mA		45	90		
	GM6250-3.6V		V_{IN}=4.6V, 1mA≤ I_{OUT}≤ 100mA		45	90		
	GM6250-4.0V		V_{IN}=5.0V, 1mA≤ I_{OUT}≤ 100mA		40	80		
	GM6250-4.4V		V_{IN}=5.4V, 1mA≤ I_{OUT}≤ 100mA		40	80		
	GM6250-4.5V		V_{IN}=4.5V, 1mA≤ I_{OUT}≤ 100mA		40	80		
	GM6250-5.0V		V_{IN}=6.0V, 1mA≤ I_{OUT}≤ 100mA		40	80		
Input - Output Voltage Differential (Note 3)	GM6250-1.8V	Vdif1	I_{OUT} = 60mA		180	360	mV	1
		Vdif2	I_{OUT} = 160mA		900	1300		
	GM6250-2.5V	Vdif1	I_{OUT} = 80mA		180	360		
		Vdif2	I_{OUT} = 160mA		550	850		
	GM6250-2.7V	Vdif1	I_{OUT} = 80mA		180	360		
		Vdif2	I_{OUT} = 160mA		400	700		
	GM6250-2.8V	Vdif1	I_{OUT} = 80mA		180	360		
		Vdif2	I_{OUT} = 160mA		400	700		
	GM6250-3.0V	Vdif1	I_{OUT} = 80mA		180	360		
		Vdif2	I_{OUT} = 160mA		400	700		
	GM6250-3.2V	Vdif1	I_{OUT} = 80mA		180	360		
		Vdif2	I_{OUT} = 160mA		400	700		
	GM6250-3.3V	Vdif1	I_{OUT} = 100mA		170	330		
		Vdif2	I_{OUT} = 200mA		400	630		
	GM6250-3.5V	Vdif1	I_{OUT} = 100mA		120	300		
		Vdif2	I_{OUT} = 200mA		380	600		
	GM6250-3.6V	Vdif1	I_{OUT} = 100mA		120	300		
		Vdif2	I_{OUT} = 200mA		380	600		
	GM6250-4.0V	Vdif1	I_{OUT} = 100mA		170	330		
		Vdif2	I_{OUT} = 200mA		400	630		
	GM6250-4.4V	Vdif1	I_{OUT} = 100mA		120	300		
		Vdif2	I_{OUT} = 200mA		380	600		
	GM6250-4.5V	Vdif1	I_{OUT} = 100mA		120	300		
		Vdif2	I_{OUT} = 200mA		380	600		
	GM6250-5.0V	Vdif1	I_{OUT} = 100mA		120	300		
		Vdif2	I_{OUT} = 200mA		380	600		

◆ ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Circuit
Supply Current	GM6250-1.8V	I_{SS}	V_{IN} = 2.8V		1.0	2.9	μA	2
	GM6250-2.5V		V_{IN} = 3.5V					
	GM6250-2.7V		V_{IN} = 3.7V					
	GM6250-2.8V		V_{IN} = 3.8V					
	GM6250-3.0V		V_{IN} = 4.0V					
	GM6250-3.2V		V_{IN} = 4.2V					
	GM6250-3.3V		V_{IN} = 4.3V					
	GM6250-3.5V		V_{IN} = 4.5V					
	GM6250-3.6V		V_{IN} = 4.6V					
	GM6250-4.0V		V_{IN} = 5.0V					
	GM6250-4.4V		V_{IN} = 5.4V					
	GM6250-4.5V		V_{IN} = 5.5V					
	GM6250-5.0V		V_{IN} = 6.0V					
Output Current Limit					500		mA	-
Input Stability	GM6250-1.8V	$\frac{V_{OUT}}{VIN \bullet VOUT}$	I_{OUT} = 40mA 2.8V ≤ V_{IN} ≤ 10.0V		0.2	0.3	%/ V	1
	GM6250-2.5V		I_{OUT} = 40mA 3.5V ≤ V_{IN} ≤ 10.0V					
	GM6250-2.7V		I_{OUT} = 40mA 3.7V ≤ V_{IN} ≤ 10.0V					
	GM6250-2.8V		I_{OUT} = 40mA 3.8V ≤ V_{IN} ≤ 10.0V					
	GM6250-3.0V		I_{OUT} = 40mA 4.0V ≤ V_{IN} ≤ 10.0V					
	GM6250-3.2V		I_{OUT} = 40mA 4.2V ≤ V_{IN} ≤ 10.0V					
	GM6250-3.3V		I_{OUT} = 40mA 4.3V ≤ V_{IN} ≤ 10.0V					
	GM6250-3.5V		I_{OUT} = 40mA 4.5V ≤ V_{IN} ≤ 10.0V					
	GM6250-3.6V		I_{OUT} = 40mA 4.6V ≤ V_{IN} ≤ 10.0V					
	GM6250-4.0V		I_{OUT} = 40mA 5.0V ≤ V_{IN} ≤ 10.0V					
	GM6250-4.4V		I_{OUT} = 40mA 5.4V ≤ V_{IN} ≤ 10.0V					
	GM6250-4.5V		I_{OUT} = 40mA 5.5V ≤ V_{IN} ≤ 10.0V					
	GM6250-5.0V		I_{OUT} = 40mA 6.0V ≤ V_{IN} ≤ 10.0V					
Input Voltage		V_{IN}				10	V	-
Output Voltage Temperature Characteristics		$\frac{V_{OUT}}{Topr \bullet VOUT}$	I_{OUT} = 10mA -30°C ≤ Topr ≤ 80°C		±100		ppm/°C	1

Note: 1. V_{OUT}(T) = Specified Output Voltage

2. V_{OUT}(E) = Effective Output Voltage (the output voltage when"V_{OUT}(T) + 1.0V" is provided at the V_{IN} pin while maintaining a certain I_{OUT} value)

3. Vdif = { V_{IN}1 (Note 4) - V_{OUT} (E)}

4. V_{IN}1 = The input voltage at the time 98% of V_{OUT}(E) is output (input voltage has been gradually reduced).

* Output Voltage from 1.8V to 6.0V in 0.1V increments ate available

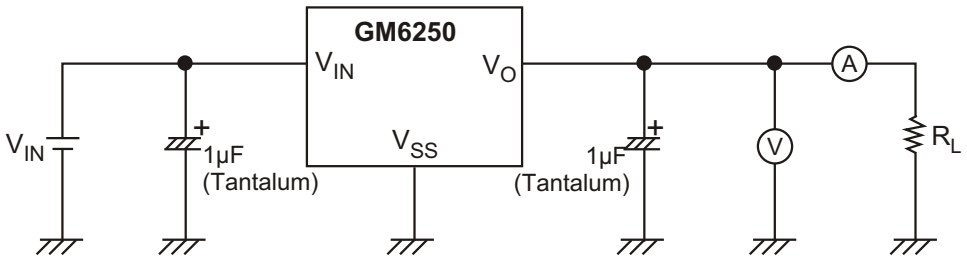
◆ DIRECTIONS FOR USE

Notes on Use

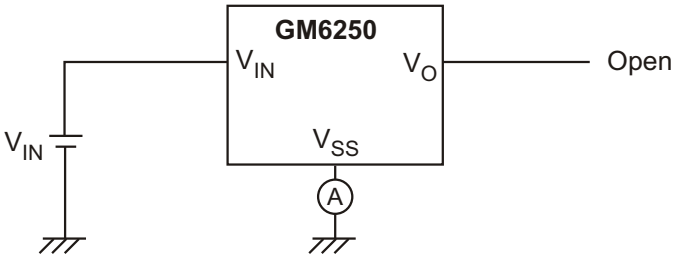
1. Please use this IC within the stipulated absolute maximum ratings as the IC is liable to malfunction outside of such parameters.
2. There is a possibility theat oscillation may occur as a result of the impedance present between the power supply and the IC's input. Where impedance is 10 or more, please use a capacitor (C_{IN}) of at least 1μF.
   With a large output current, operations can be stabilised by increasing capacitor size (C_{IN}). If C_{IN} is small and capacitor size (C_L) is increased, there is a possibility of oscillation due to input impedance. In such cases, operations can be stabilised by either increasing the size of C_{IN} of decreasing the size of C_L.
3. Please ensure that output current (I_{OUT}) is less than Pd ÷ (V_{IN} - V_{OUT}) and does not exceed the stipulated continuous total power dissipation value (Pd) for the package.

◆ TEST CIRCUIT

Circuit 1



Circuit 2



PERFORMANCE CHARACTERISTICS FOR GM6250 - 3.0

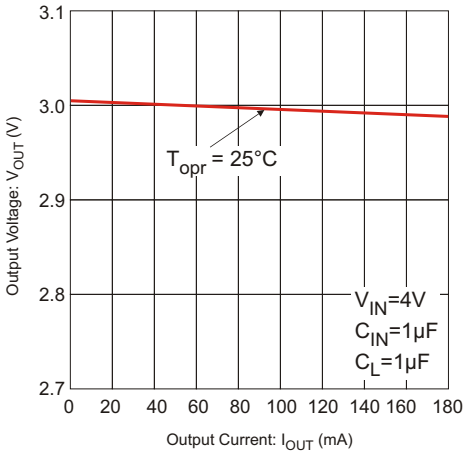


Figure 1: Output Voltage vs. Output Current

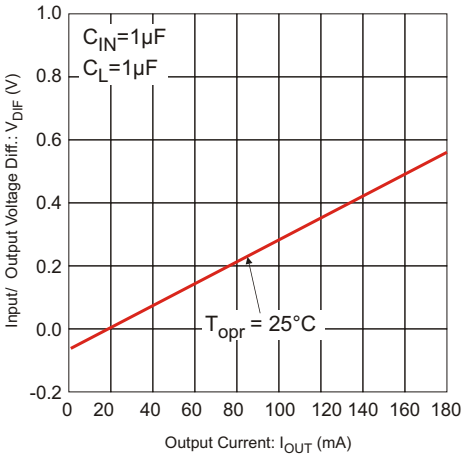


Figure 2: Input/ Output Voltage differential vs. Output Current

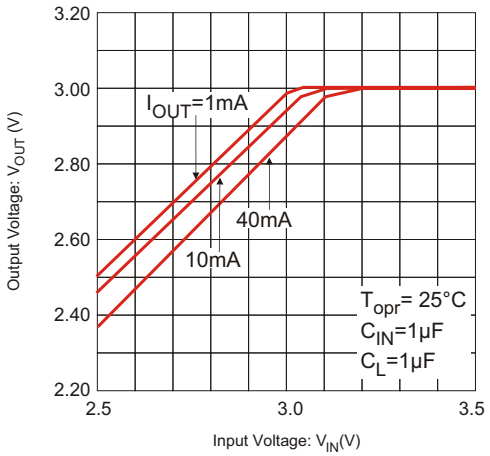


Figure 3: Output Voltage vs. Input voltage

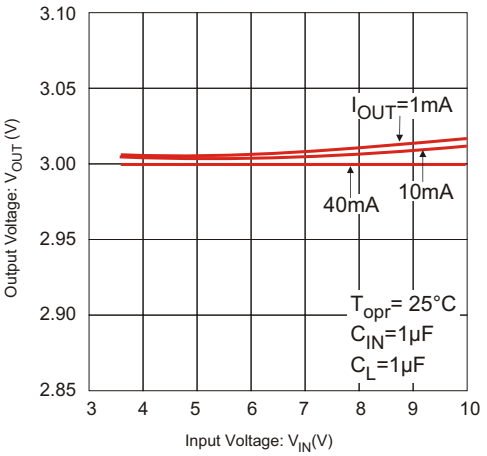


Figure 4: Output Voltage vs. Input voltage

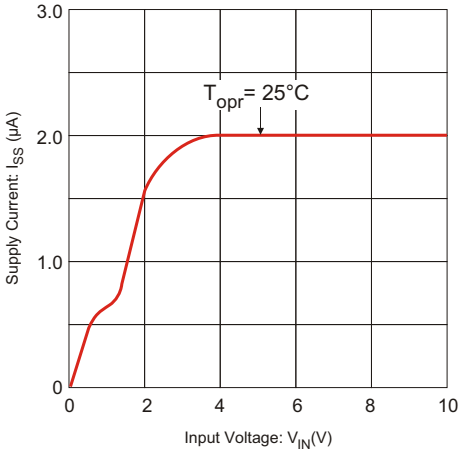


Figure 5: Supply Current vs. Input Voltage

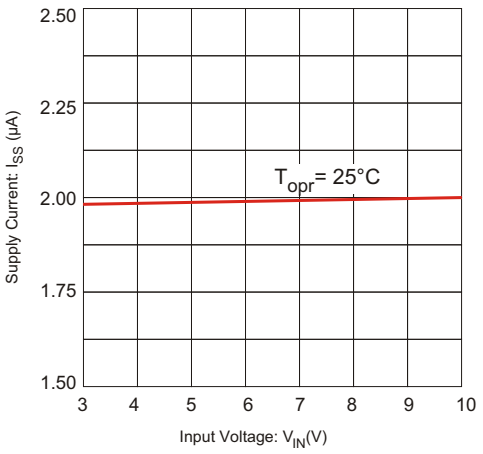


Figure 6: Supply Current vs. Input Voltage

PERFORMANCE CHARACTERISTICS FOR GM6250 - 3.0

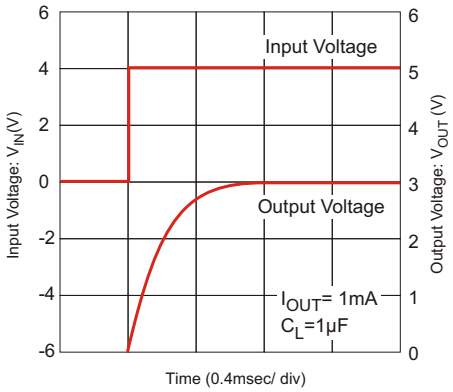


Figure 7: Input Transient Response 1

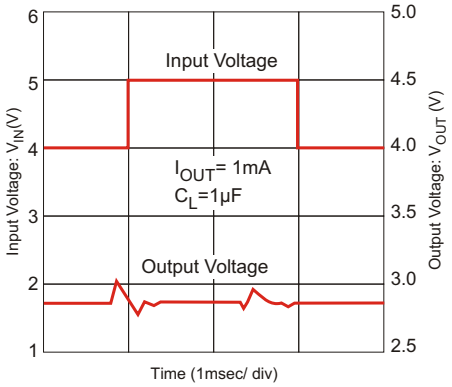


Figure 8: Input Transient Response 2

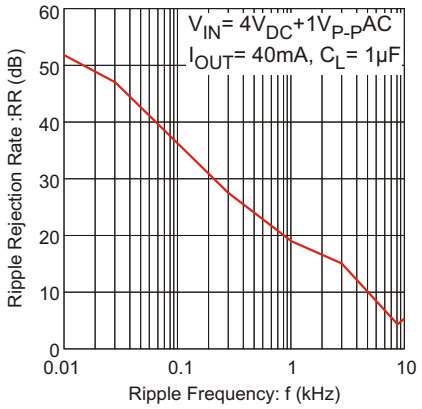
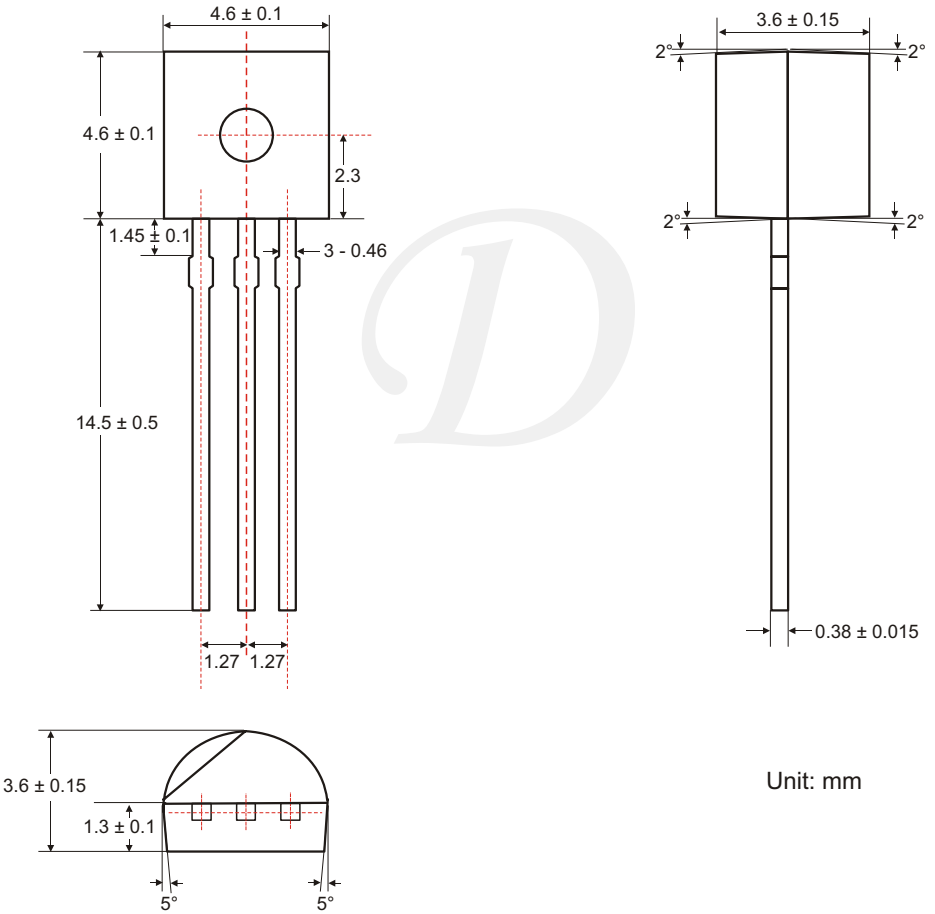


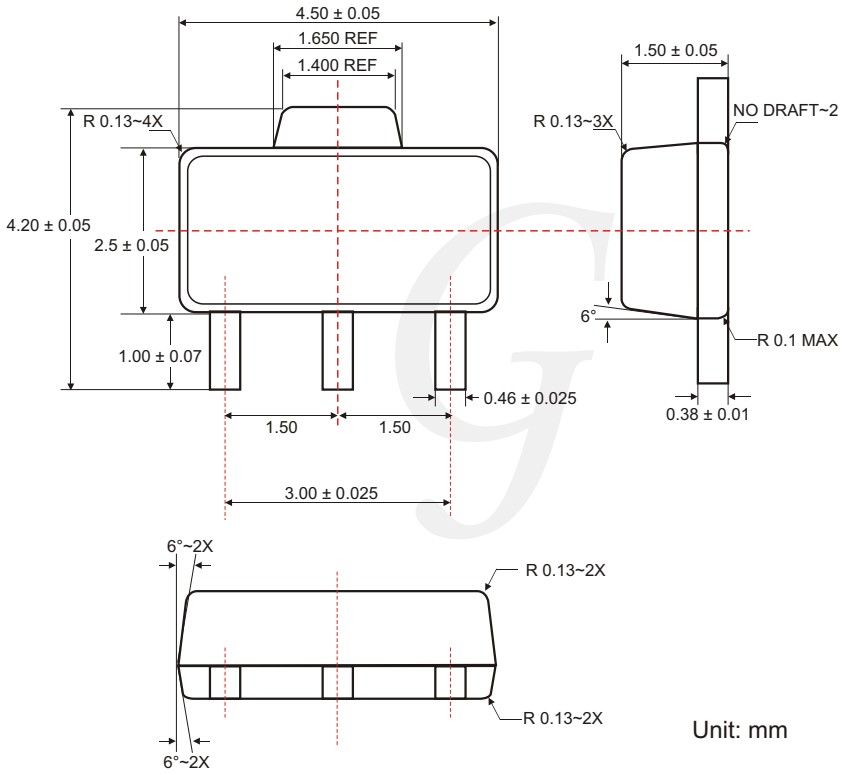
Figure 9: Ripple Rejection Rate

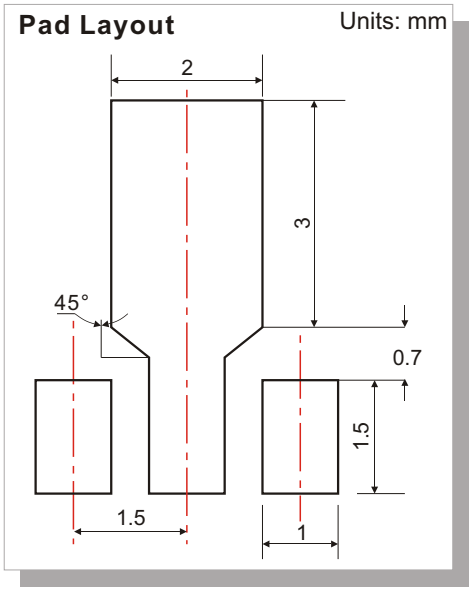
TO-92 PACKAGE OUTLINE DIMENSIONS



Unit: mm

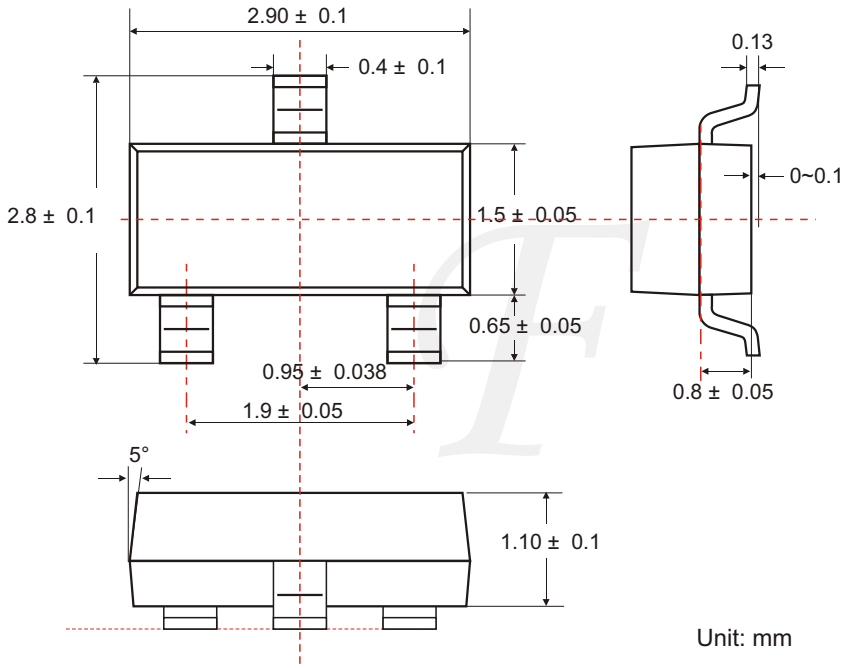
◆ SOT-89 PACKAGE OUTLINE DIMENSIONS

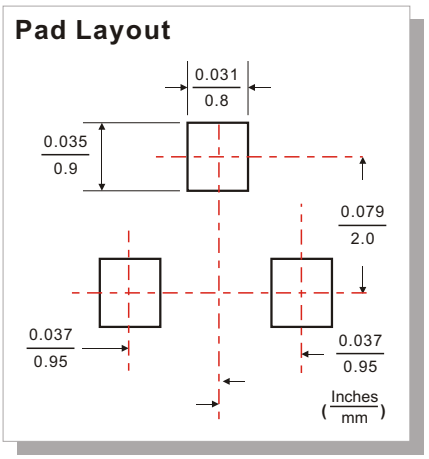




Unit: mm

◆ SOT-23 PACKAGE OUTLINE DIMENSIONS





Unit: mm

◆ ORDERING NUMBER