

Description

GM9130HV is the monolithic IC designed for a step-down DC/DC converter capable of driving 3A load without an additional transistor. The input voltage range is up to 60V. Its feedback voltage, V_{FB} , is 200mV. The GM9130HV operates at a switching frequency of 52kHz. The external shutdown function is controlled by a logic level on the $\overline{ON/OFF}$ pin and then the circuit comes into the standby mode with $I_{STBY} \sim 50 \mu A$ (typ.).

The $\overline{ON/OFF}$ pin may be used for the analog dimming. As the voltage on the $\overline{ON/OFF}$ pin is increased from 0.07V to 0.67V, the voltage on the FB pin falls from 200mV to 0.

The self-protection features include a cycle-by-cycle current limit and a thermal protection.

The GM9130HV is available in standard TO220-5, and TO263-5 packages.

Besides, SOP8 with heat sink and TO252-5 packages are also available. However, these packages are limited to heat dissipation and the I_{LED} is suggested below 2A.

Features

- ◆ Maximum input voltage up to 60V
- ◆ V_{FB} : 200mV
- ◆ Frequency: 52KHz
- ◆ $I_{LED} = 3.0A$ maximum
- ◆ $\overline{ON/OFF}$ input may be used for the analog dimming
- ◆ Thermal protection
- ◆ Cycle by cycle current limit

Typical Application Circuits

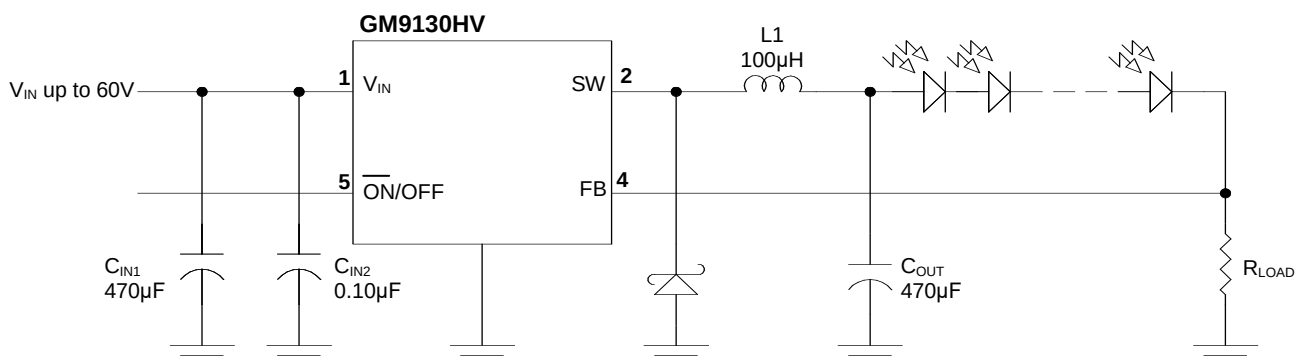
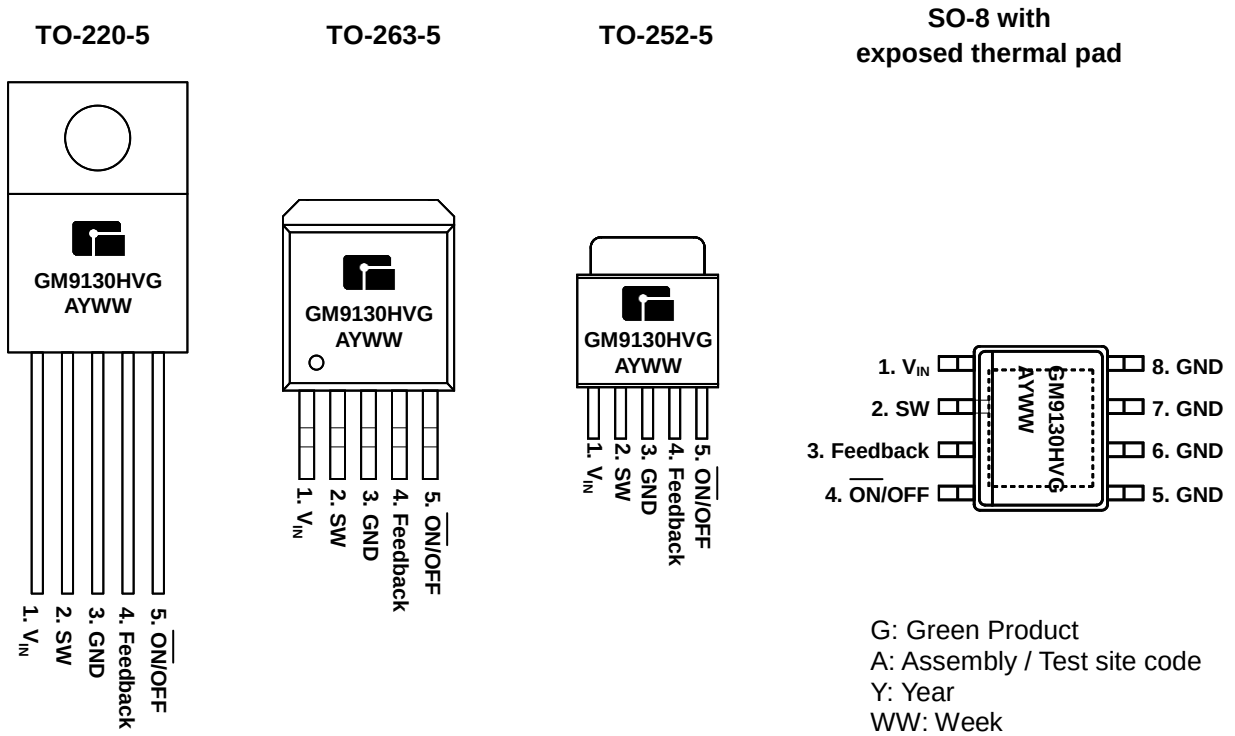


Figure 1. Application for GM9130HV

Marking Information and Pin Configurations (Top View)



Ordering Information

Ordering Number	Oscillation Frequency	Package	Shipping
GM9130HVTA5RG	52KHz	TO263-5	800 Units / Reel
GM9130HVTB5TG		TO220-5	50 Units / Tube
GM9130HVTC5RG		TO252-5	2,500 Units / Reel
GM9130HVPS8RG		PSOP8	2,500 Units / Reel

Absolute Maximum Ratings (Note 1)

Rating		Symbol	Value	Unit
Maximum Supply Voltage		V_{IN}	63	V
$\overline{ON/OFF}$ Pin Input Voltage		$V_{ON/OFF}$	-0.3 to V_{IN}	V
Feedback Pin Voltage		V_{FB}	-0.3 to V_{IN}	V
Minimum SW Voltage		V_{SW}	-0.8	V
Power Dissipation		P_D	Internally Limited	-
Thermal Resistance	TO220-5	θ_{JA}	45	$^{\circ}C/W$
	TO263-5		50	
	TO252-5		70	
	PSOP8		36.5*	
Storage Temperature Range		T_{STG}	- 65 to 150	$^{\circ}C$
Maximum Junction Temperature		T_J	+ 150	$^{\circ}C$
Minimum EDS Rating (Note 2)			2	kV
Lead Temperature (Soldering, 10 sec)			+ 260	$^{\circ}C$

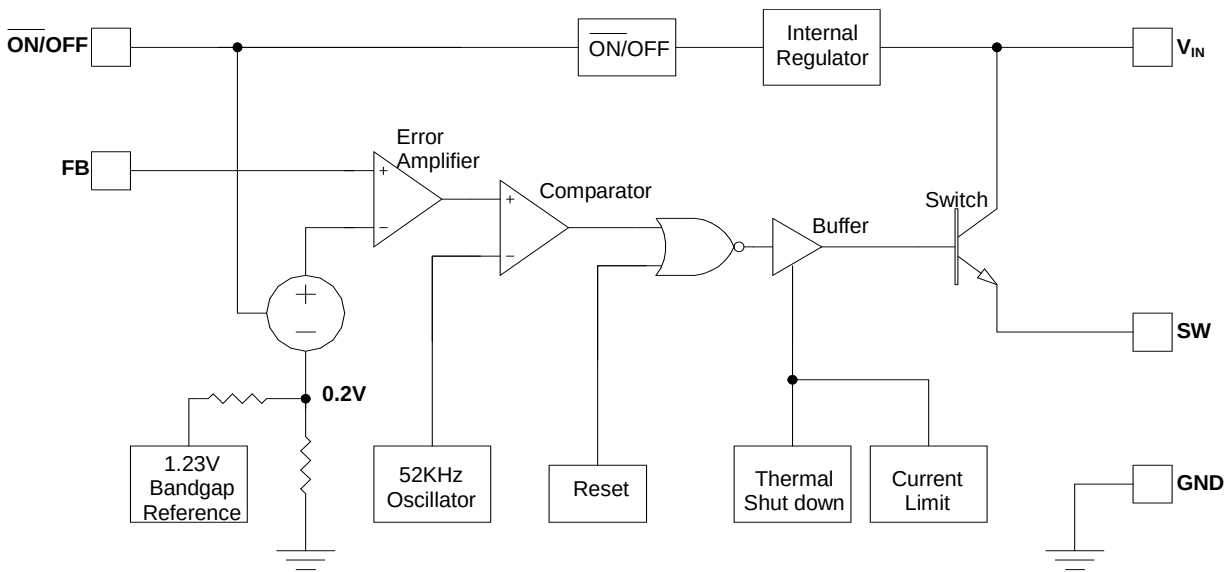
Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur.

* 2 square inch of FR-4, double sided, 1oz. minimum copper weight, is recommended

Recommended Operating Conditions

Rating	Symbol	Value	Unit
Supply Voltage	V_{IN}	5.5 to 60	V
Operating Temperature Range	T_{OPR}	- 40 to 125	°C

Block Diagram



Electrical Characteristics Specifications with standard type face are for $T_J=25^{\circ}\text{C}$, and those with **Bold type** apply over **Full Operating Temperature Range**

Parameter	Condition	Symbol	Min	Typ	Max	Unit
Feedback Voltage	$V_{IN} = 12\text{V}$, $I_{LOAD} = 350\text{mA}$, $\overline{\text{ON/OFF}} = 0\text{V}$	V_{FB}	190	200	210	mV
	$5.5\text{V} < V_{IN} < 12\text{V}$, $I_{LOAD} = 350\text{mA}$, $\overline{\text{ON/OFF}} = 0\text{V}$ (Note 2)		184		216	
			180		220	
Efficiency	$V_{IN} = 12\text{V}$, $I_{LOAD} = 3.0\text{A}$	η		65		%
FB input current	$V_{FB} = 250\text{mV}$, $\overline{\text{ON/OFF}} = 0\text{V}$	I_{FB}		50	150	nA
					500	
Oscillator Frequency		F_{OSC}	47	52	58	kHz
			42		63	
Saturation Voltage	$I_{SW} = 3\text{A}$	V_{SAT}		1.35	1.5	V
					1.7	
Current Limit		CL	3.7	5.0	6.7	A
Maximum Duty Cycle		DC_{MAX}	100			%
SW Leakage Current	$V_{IN} = 60\text{V}$, $V_{SW} = 0\text{V}$, $V_{FB} = 1.5\text{V}$	I_{LO}	-0.3	--0.07		mA
	$V_{IN} = 60\text{V}$, $V_{SW} = -0.8\text{V}$, $V_{FB} = 1.5\text{V}$		-30	-8		
Threshold Voltage $\overline{\text{ON/OFF}}$		$V_{TH \overline{\text{ON/OFF}}}$	1.0	1.4	2.0	V
			0.8		2.2	
Input Current $\overline{\text{ON/OFF}}$	$V_{\overline{\text{ON/OFF}}} = 2.5\text{V}$	I_{IH}	-5	0.01	5	μA
	$V_{\overline{\text{ON/OFF}}} = 0\text{V}$	I_{IL}	-2	-0.3		
Quiescent Current	$V_{FB} = 1.5\text{V}$	I_Q		5.3	10	mA
Standby Current	$V_{\overline{\text{ON/OFF}}} = 5\text{V}$, $V_{IN} = 60\text{V}$	I_{STBY}		50	200	μA
Dimming Voltage	$I_{LED} = 0$, $V_{IN} = 12\text{V}$, see Fig 1	$V_{\overline{\text{ON/OFF}}}$	600	670	750	mV

Note 2 LED must be ensured with load current (I_{LOAD}) at $V_{IN \text{ MIN}}$

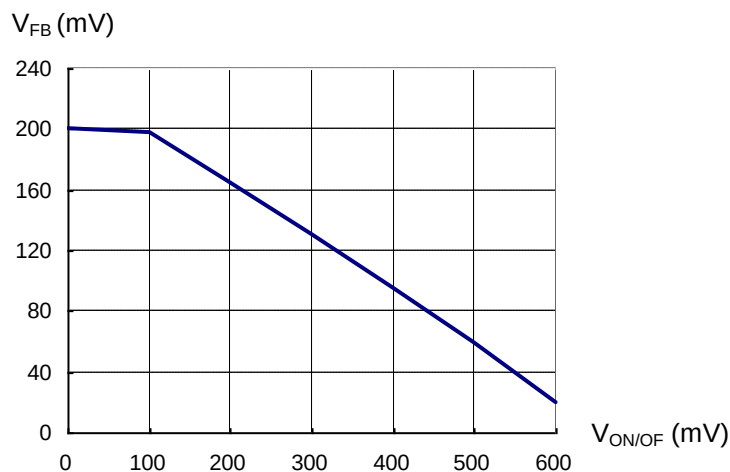


Figure 2 Dimming Voltage vs V_{FB}

Application Notes

Output Current (ILED) Design, refer to Figure 1

The current through the LED's can be set by the formula below.

$$I_{LED} = V_{FB} / R_{LOAD}$$

For example, if 2Ω R_{LOAD} is selected, with $V_{FB} = 200mV$ typical, then

$$I_{LED} = 200 / 2 = 100mA$$

Power / Heat Consideration

Various I_{LED} could be obtained by different resistor values as mentioned above. However, taking the TO263-5 as an example, the maximum power rating must be followed.

$$T_J = P_{IC} \times \theta_{JA} + T_A$$

where P_{IC} is the power of the IC itself, and θ_{JA} is the thermal resistance (junction to ambient). For TO263-5, the θ_{JA} is $50^\circ C/W$, the safe power will be

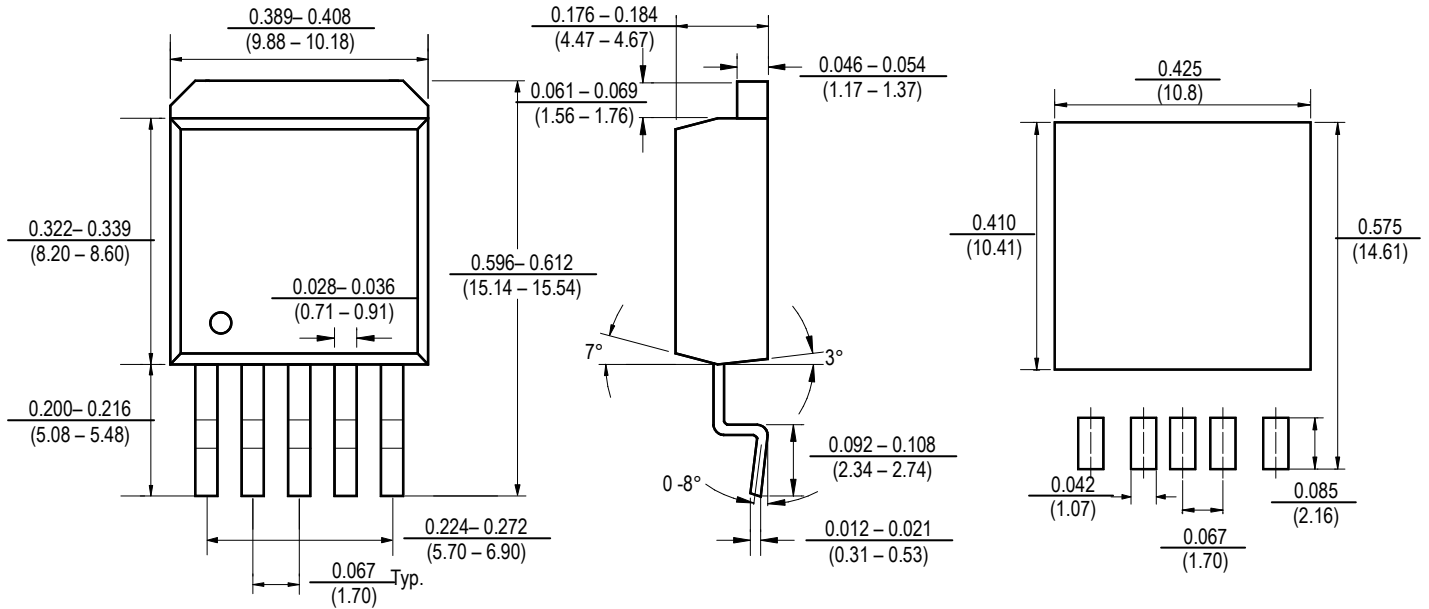
$$P_{IC} = (T_J - T_A) / \theta_{JA} = (150 - 25) / 50 = 2.5W, \text{ and}$$

$$P_{IC} = P_{IN} - P_{LED}, \text{ Where}$$

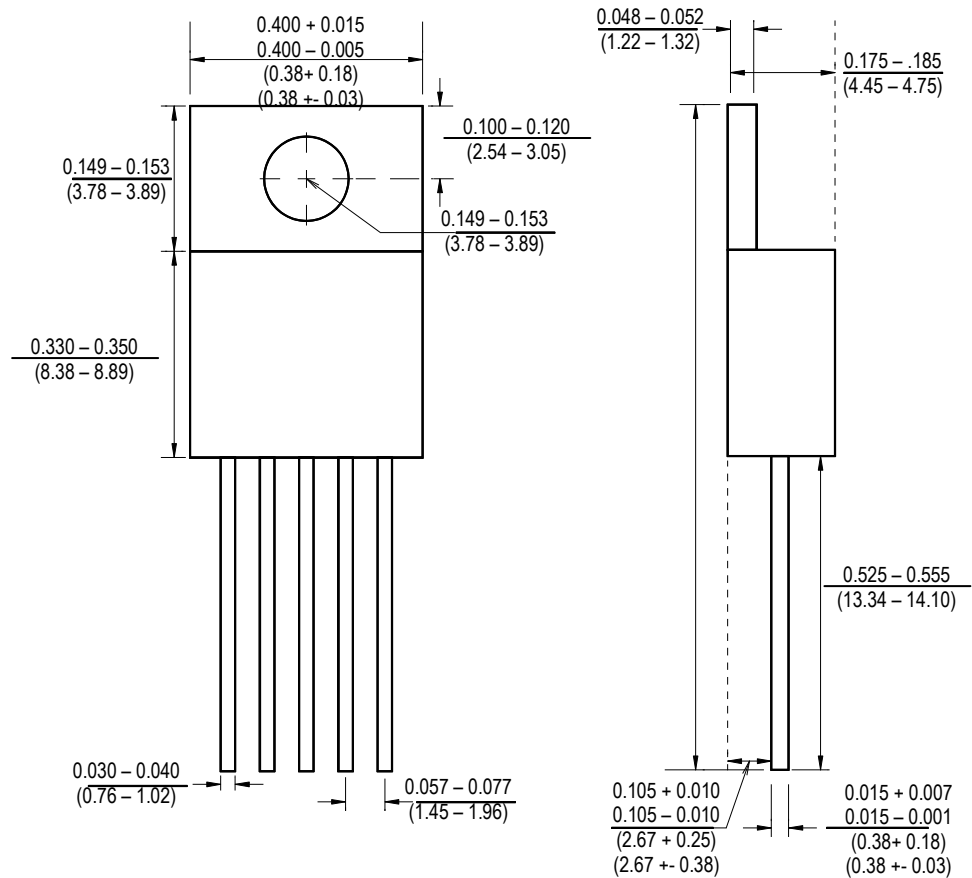
$$P_{IN} = V_{IN} \times I_{IN}, \text{ and}$$

$$P_{LED} = V_{OUT} \times I_{LED} \quad (V_{OUT} = V_F \times \text{number of LED})$$

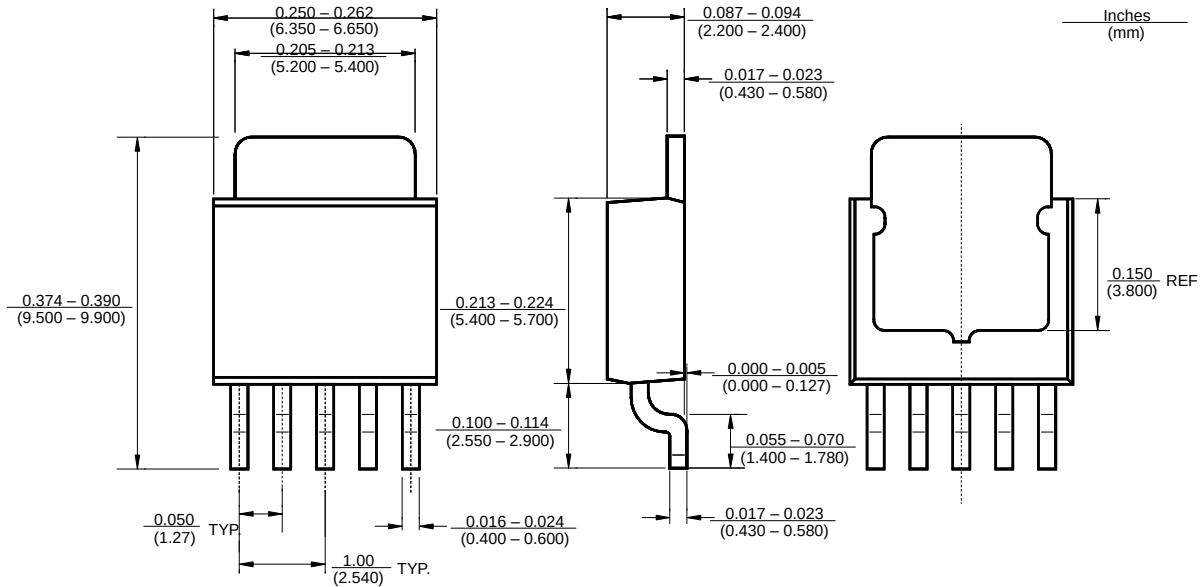
Package Outline Dimensions – TO-263-5



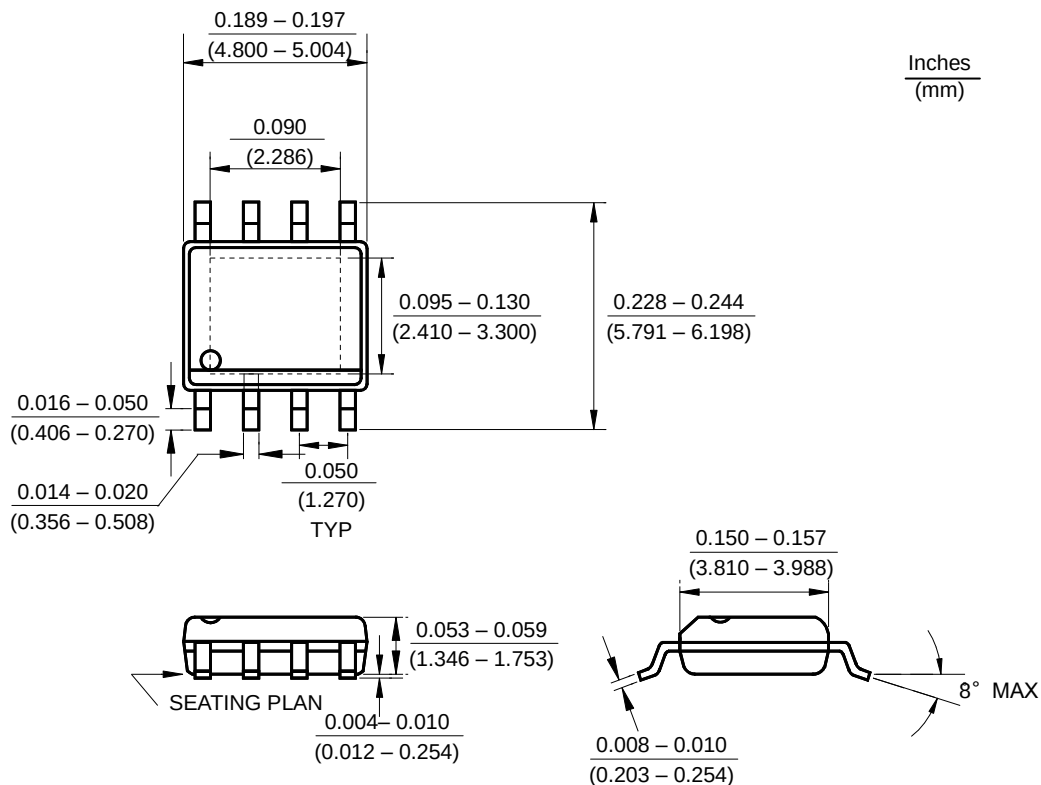
Package Outline Dimensions – TO-220-5



Package Outline Dimensions – TO252-5



Package Outline Dimensions – PSOP 8





GAMMA
MICROELECTRONICS

GM9130HV

3A LED Driver with Dimming Control

Ordering Number

GM 9130HV

APM
Gamma
Micro

Circuit Type

TA5

Package Type

TA5: TO263-5
TB5: TO220-5
TC5: TO252-5
PS8: PSOP8

R

Shipping Type

R:Taping & Reel
T:Tube

G

G: Green

Note:

Green products:

- ◆ Lead-free (RoHS compliant)
- ◆ Halogen free(Br or Cl does not exceed 900ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500ppm by weight)