

# 1 W Heterojunction Field Effect Transistor (HFET) DC - 6 GHz



**XF1001-SC**  
Rev. V3

## Features

- 15.5 dB Gain @ 1.9 GHz
- 10.0 dB Gain @ 5.8 GHz
- 46.5 dBm Output IP3
- 30.0 dBm P1dB
- SOT-89 Surface Mount Technology Package
- RoHS\* Compliant

## Applications

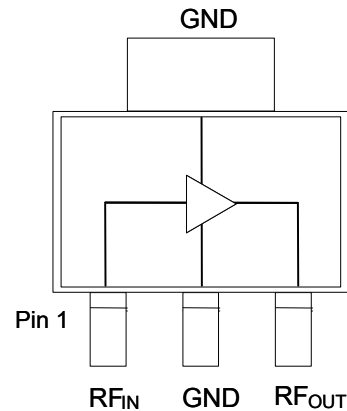
- Aerospace and Defense
- Wireless Networking and Communication

## Description

The XF1001-SC is a high linearity Heterojunction Field Effect Transistor (HFET) housed in an industry standard SOT-89 package. Optimum performance is achieved when the device is biased at a drain voltage of 8 V and drain current of 300 mA. At this bias point, the device is capable of >30 dBm of P1dB and OIP3 of >46 dBm.

The XF1001-SC is suitable for applications up to 6 GHz where it has 10 dB of gain.

## Functional Block Diagram



## Pin Configuration<sup>3</sup>

Pin #	Function
1	RF Input
2, 4	Ground
3	RF Output / Bias

3. The exposed pad centered on the package bottom must be connected to RF, DC and thermal ground.

## Ordering Information<sup>1,2</sup>

Part Number	Package
XF1001-SC-0G00	Bulk Packaging
XF1001-SC-0G0T	3000 piece reel
XF1001-SC-EV1	Evaluation Board

1. Reference Application Note M513 for reel size information.
2. All sample boards include 5 loose parts.

\* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.

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**Electrical Specifications:  $T_A = +25^\circ\text{C}$ ,  $V_{DD} = 8\text{ V}$ ,  $Z_0 = 50\ \Omega$**

Parameter	Conditions	Units	Min.	Typ.	Max.
Gain	Externally matched 1.9 GHz 5.8 GHz	dB	13.5 —	15.5 10.0	—
Noise Figure	1.9 GHz 5.8 GHz	dB	—	4.5 5.0	—
Input Return Loss	1.9 GHz 5.8 GHz	dB	—	12.5 22.5	—
Output Return Loss	1.9 GHz 5.8 GHz	dB	—	7.5 7.5	—
Output P1dB	1.9 GHz 5.8 GHz	dBm	29 —	30 30	—
Output IP3	Pout/Tone = 13 dBm, Spacing = 5 MHz 1.9 GHz 5.8 GHz	dBm	44.0 —	46.5 46.5	—
Quiescent Current	1.9 GHz 5.8 GHz	mA	—	300 300	330 —

## Absolute Maximum Ratings<sup>4,5</sup>

Parameter	Absolute Maximum
Supply Voltage	9 V
Gate Voltage ( $V_G$ )	$-2.5\text{ V} < V_G < 0\text{ V}$
Input Power	24 dBm
Power Dissipation	4.5 W
Current	450 mA
Junction Temperature	$+175^\circ\text{C}$
Operating Temperature	$-40^\circ\text{C}$ to $+85^\circ\text{C}$
Storage Temperature	$-55^\circ\text{C}$ to $+150^\circ\text{C}$
Thermal Resistance	$30^\circ\text{C/W}$

- Exceeding any one or combination of these limits may cause permanent damage to this device.
- MACOM does not recommend sustained operation near these survivability limits.

## Handling Procedures

Please observe the following precautions to avoid damage:

### Static Sensitivity

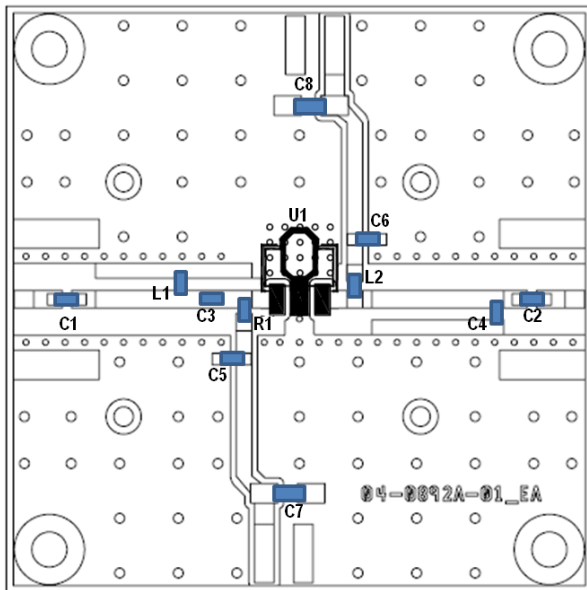
These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these Class 1A devices.

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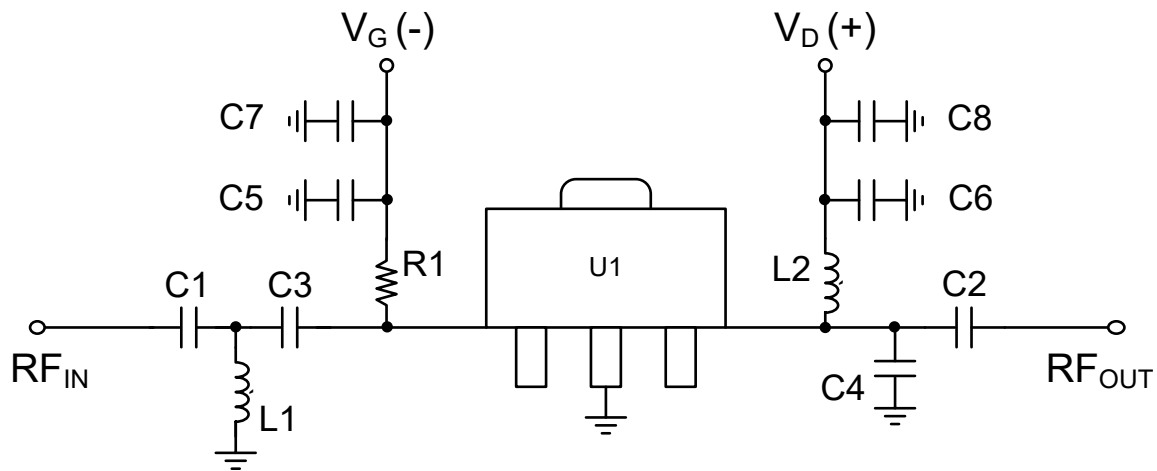
## PCB Layout @ 1.9 GHz



## Parts List @ 1.9 GHz

Part	Value	Case Style
C1, C2	100 pF	0603
C3	2.2 pF	0603
C4	1.2 pF	0603
C5, C6	1000 pF	0603
C7, C8	3.3 $\mu$ F	0805
L1	1.6 nH	0603
L2	24 nH	0603
R1	2.49 K $\Omega$	0603

## Application Schematic @ 1.9 GHz



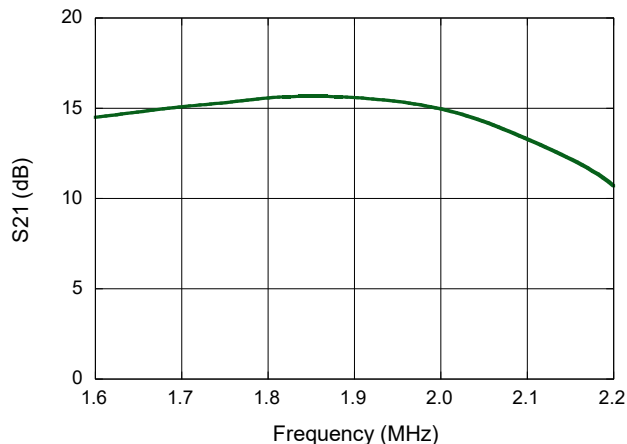
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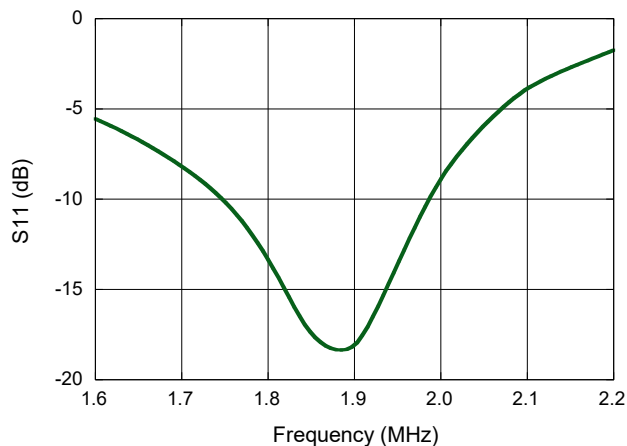
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## Typical Performance Curves @ 1.9 GHz

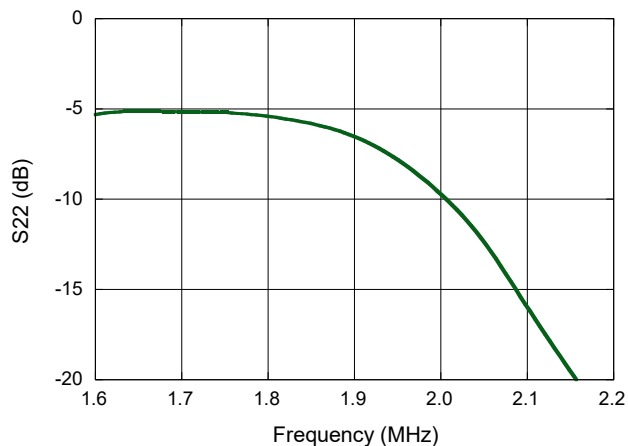
### Gain



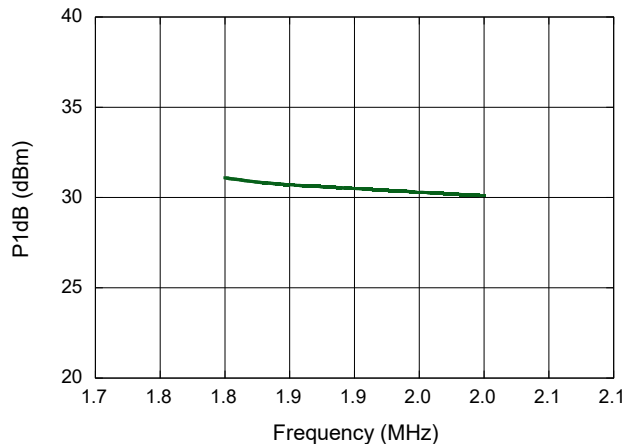
### Input Return Loss



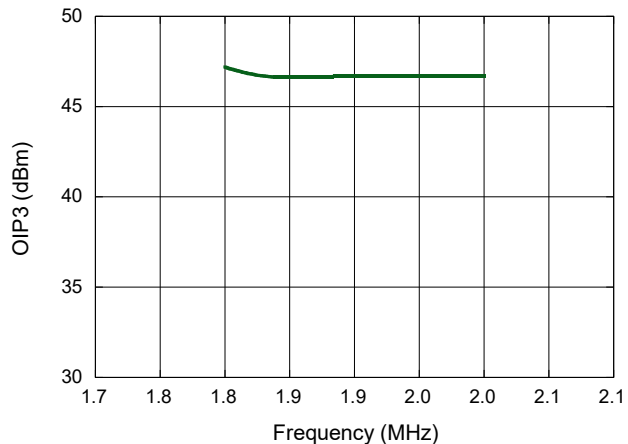
### Output Return Loss



### P1dB



### OIP3

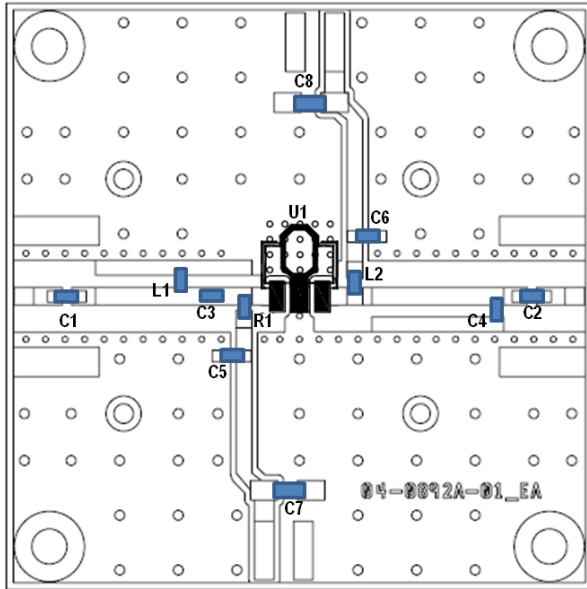


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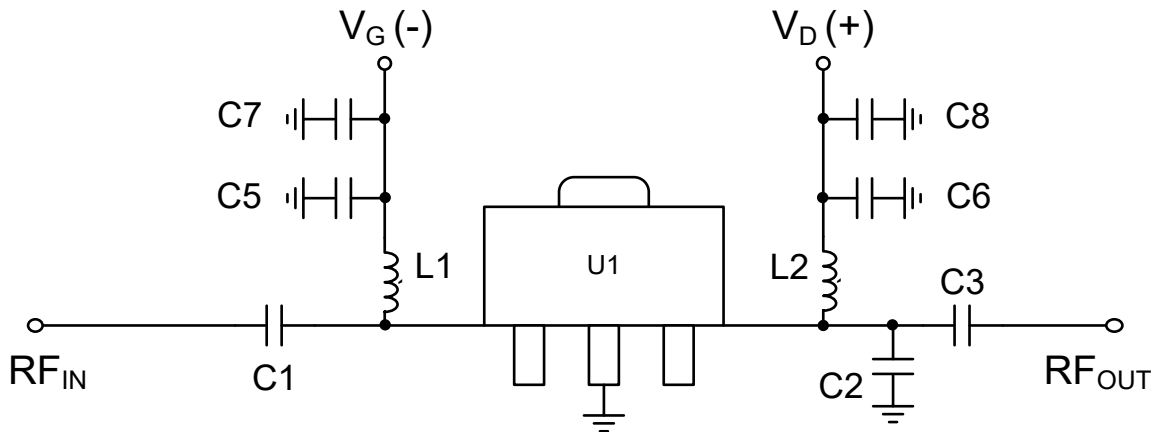
## PCB Layout @ 5.8 GHz



## Parts List @ 5.8 GHz

Part	Value	Case Style
C1, C2	100 pF	0603
C3	2.2 pF	0603
C4	1.2 pF	0603
C5, C6	1000 pF	0603
C7, C8	3.3 $\mu$ F	0805
L1	1.6 nH	0603
L2	24 nH	0603
R1	2.49 K $\Omega$	0603

## Application Schematic @ 5.8 GHz



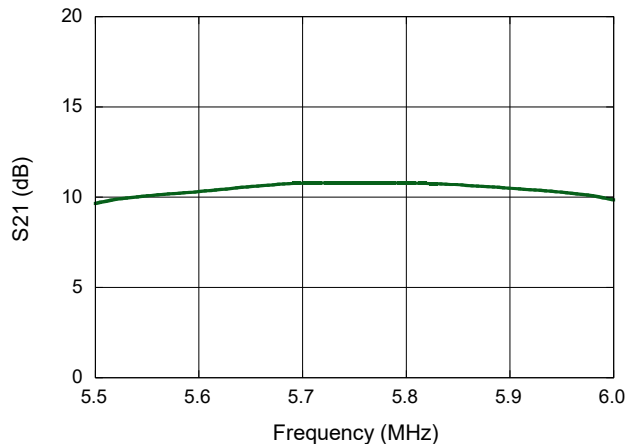
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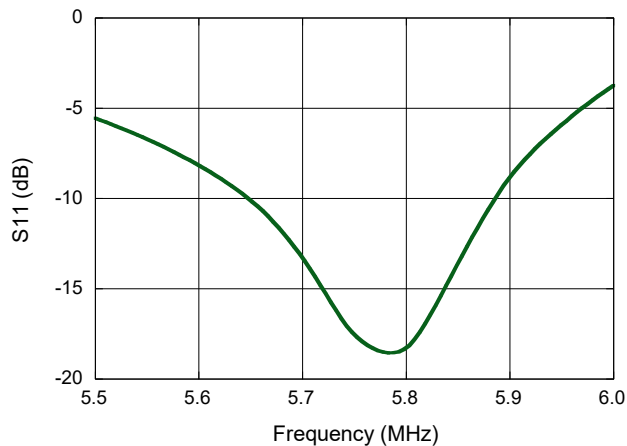
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## Typical Performance Curves @ 5.8 GHz

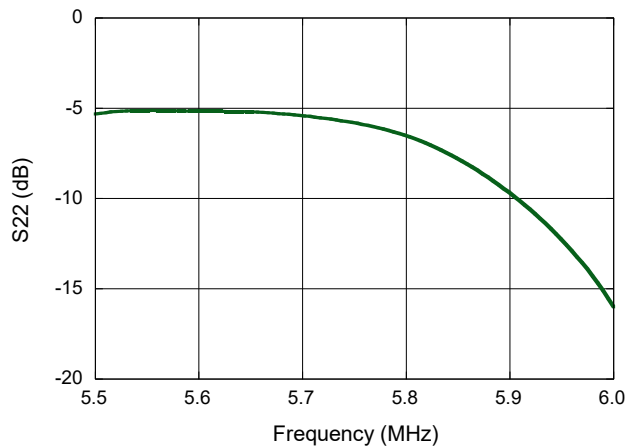
### Gain



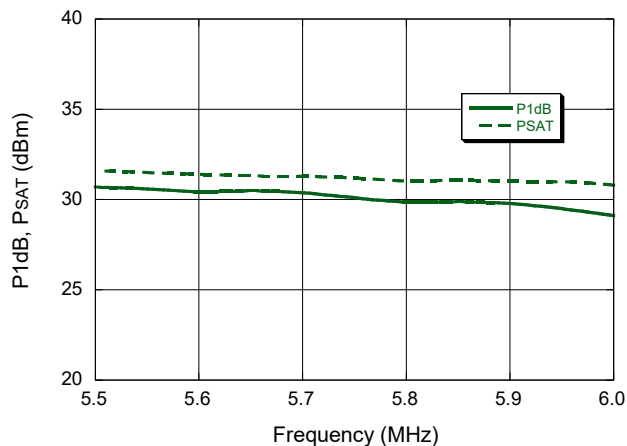
### Input Return Loss



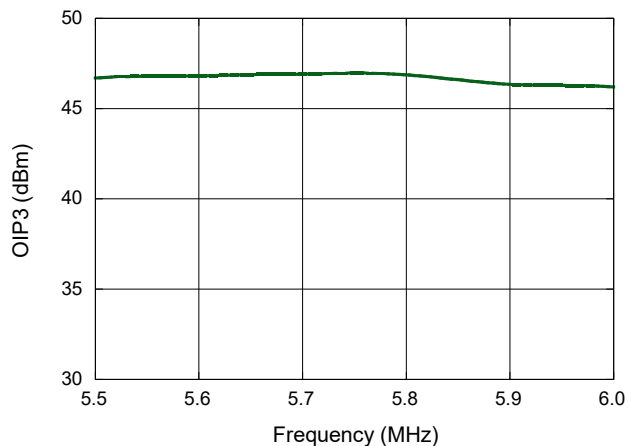
### Output Return Loss



### P<sub>1dB</sub>, P<sub>SAT</sub>



### OIP<sub>3</sub>



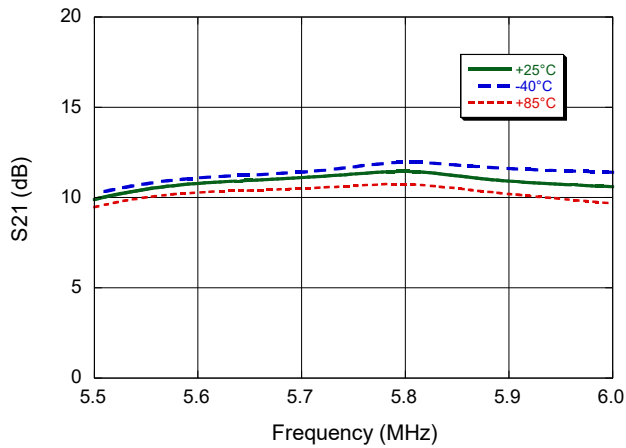
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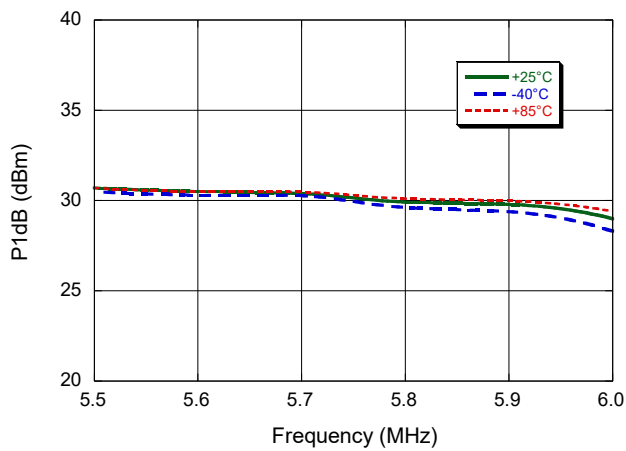
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## Typical Performance Curves @ 5.8 GHz over Temperature

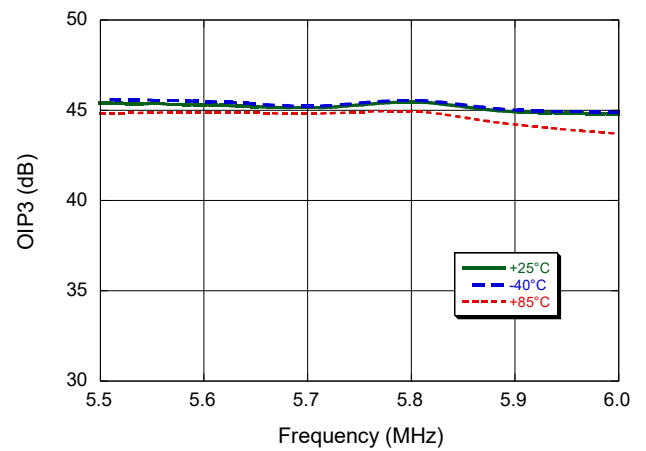
### Gain



### P1dB



### OIP3

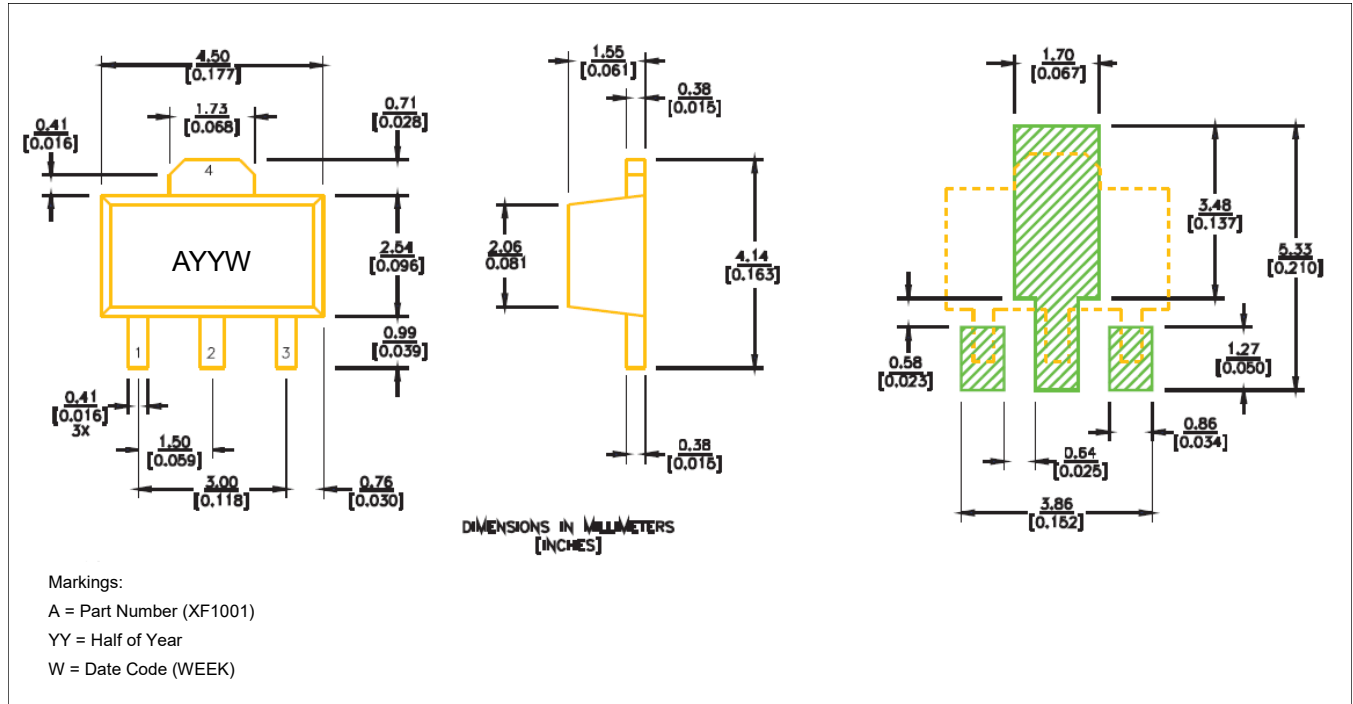


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## Lead-Free SOT-89<sup>†</sup>



<sup>†</sup> Reference Application Note M538 for lead-free solder reflow recommendations.  
 Meets JEDEC moisture sensitivity level 1 requirements.  
 Plating is 100% matte tin plating over copper



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