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FAIRCHILD SEMICONDUCTOR®

December 2013

FFB3906 / FMB3906 / MMPQ3906
PNP Multi-Chip General-Purpose Amplifier

Description

This device is designed for general-purpose amplifier and switching applications at collector currents of 10 μA to 100 mA. Sourced from Process 66.

Block Diagram

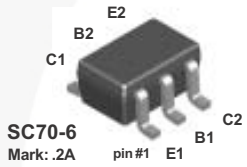


Figure 1. FFB3906 Device Package

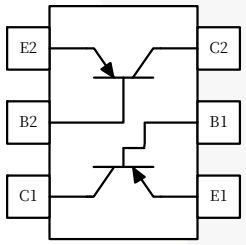


Figure 2. FFB3906 Internal Connections

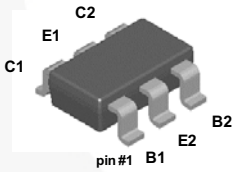


Figure 3. FMB3906 Device Package

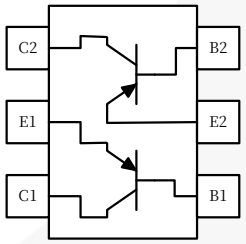


Figure 4. FMB3906 Internal Connections

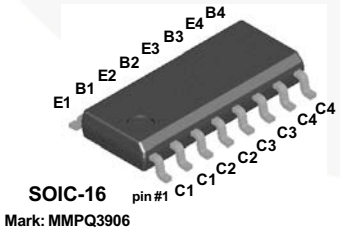


Figure 5. MMPQ3906 Device Package

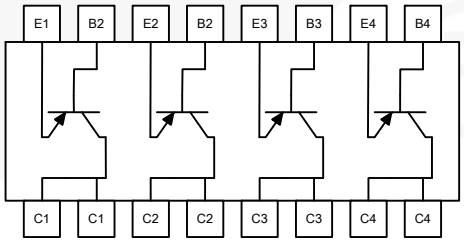


Figure 6. MMPQ3906 Internal Connections

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Ordering Information

Part Number	Top Mark	Package	Packing Method
FFB3906	.2A	SC70 6L	Tape and Reel
FMB3906	.2A	SSOT 6L	Tape and Reel
MMPQ3906	MMPQ3906	SOIC 16L	Tape and Reel

Absolute Maximum Ratings(1)

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at T_A = 25°C unless otherwise noted.

Symbol	Parameter	Value	Unit
V_{CEO}	Collector-Emitter Voltage	-40	V
V_{CBO}	Collector-Base Voltage	-40	V
V_{EBO}	Emitter-Base Voltage	-5	V
I_C	Collector Current - Continuous	-200	mA
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	°C

Note:

1. These ratings are based on a maximum junction temperature of 150°C. These are steady-state limits. Fairchild Semiconductor should be consulted on applications involving pulsed or low-duty cycle operations.

Thermal Characteristics(2)

Values are at T_A = 25°C unless otherwise noted.

Symbol	Parameter	Max.			Unit
		FFB3906	FMB3906	MMPQ3906	
P_D	Total Device Dissipation	300	700	1,000	mW
	Derate Above 25°C	2.4	5.6	8.0	mW/°C
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	415	180		°C/W
	Thermal Resistance, Junction to Ambient, Effective 4 Die			125	°C/W
	Thermal Resistance, Junction to Ambient, Each Die			240	°C/W

Note:

2. PCB size: FR-4 76 x 114 x 0.6T mm^3 (3.0 inch x 4.5 inch x 0.062 inch) with minimum land pattern size.

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Electrical Characteristics

Values are at T_A = 25°C unless otherwise noted.

Symbol	Parameter		Conditions	Min.	Typ.	Max.	Unit
Off Characteristics							
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage[3]		I_C = -1.0 mA, I_B = 0	-40			V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage		I_C = -10 μA, I_E = 0	-40			V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage		I_E = -10 μA, I_C = 0	-5.0			V
I_{BL}	Base Cut-Off Current		V_{CE} = -30 V, V_{BE} = 3.0 V			-50	nA
I_{CEX}	Collector Cut-Off Current		V_{CE} = -30 V, V_{BE} = 3.0 V			-50	nA
On Characteristics							
h_{FE}	DC Current Gain[3]	FFB3906, FMB3906	I_C = -0.1 mA, V_{CE} = -1.0 V	60			
		MMPQ3906		40			
		FFB3906, FMB3906	I_C = -1.0 mA, V_{CE} = -1.0 V	80			
		MMPQ3906		60			
		FFB3906, FMB3906	I_C = 10 mA, V_{CE} = -1.0 V	100		300	
		MMPQ3906		75			
		All Devices	I_C = -50 mA, V_{CE} = -1.0 V	60			
		All Devices	I_C = -100 mA, V_{CE} = -1.0 V	30			
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage		I_C = -10 mA, I_B = -1.0 mA			-0.25	V
			I_C = -50 mA, I_B = -5.0 mA			-0.40	
$V_{BE(sat)}$	Base-Emitter Saturation Voltage		I_C = -10 mA, I_B = -1.0 mA	-0.65		-0.85	V
			I_C = -50 mA, I_B = -5.0 mA			-0.95	
Small-Signal Characteristics (MMPQ3906 Only)							
f_T	Current Gain-Bandwidth Product		I_C = -10 mA, V_{CE} = -20 V, f = 100 MHz		200		MHz
C_{ob}	Output Capacitance		V_{CB} = -5.0 V, I_E = 0, f = 140 kHz		4.5		pF
C_{ib}	Input Capacitance		V_{EB} = -0.5 V, I_C = 0, f = 140 kHz		10		pF

Note:

3. Pulse test: pulse width ≤ 300 μs, duty cycle ≤ 2.0%.

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Typical Performance Characteristics

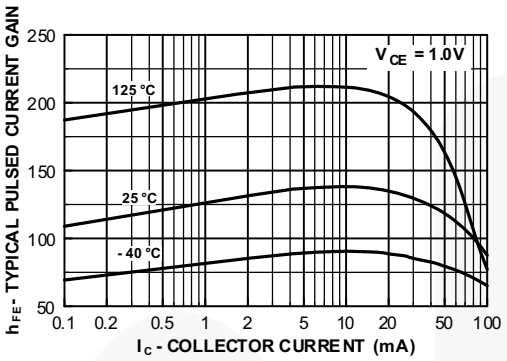


Figure 7. Typical Pulsed Current Gain vs. Collector Current

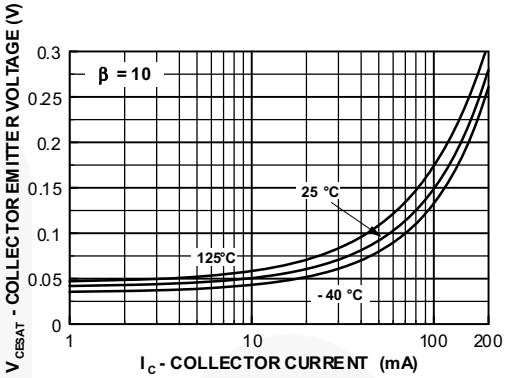


Figure 8. Collector-Emitter Saturation Voltage vs. Collector Current

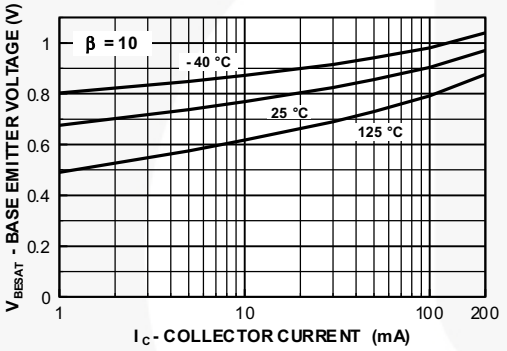


Figure 9. Base-Emitter Saturation Voltage vs. Collector Current

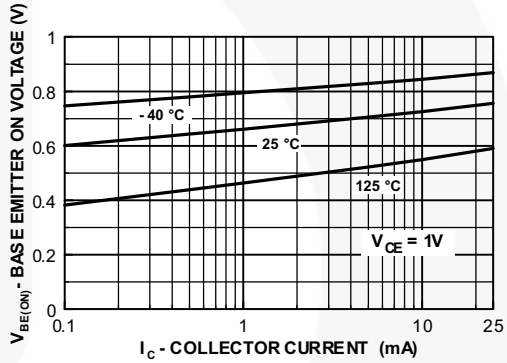


Figure 10. Base-Emitter On Voltage vs. Collector Current

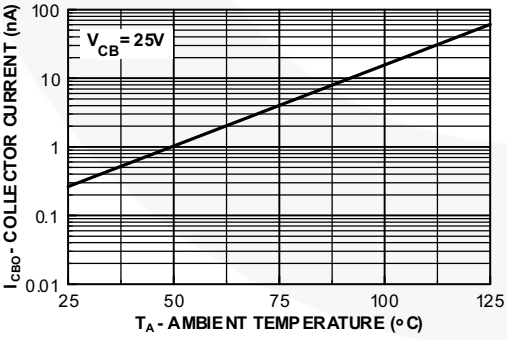


Figure 11. Collector Cut-Off Current vs. Ambient Temperature

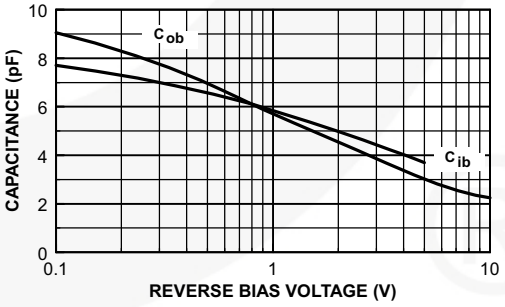


Figure 12. Common-Base Open Circuit Input and Output Capacitance vs. Reverse Bias Voltage

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Typical Performance Characteristics (Continued)

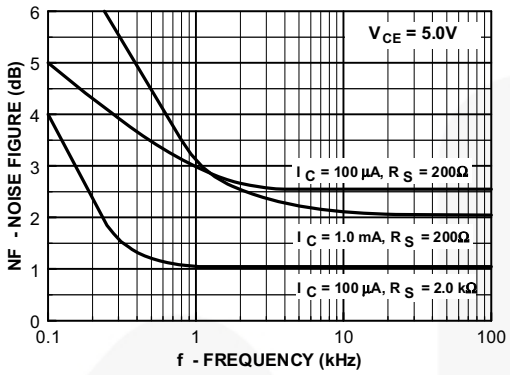


Figure 13. Noise Figure vs. Frequency

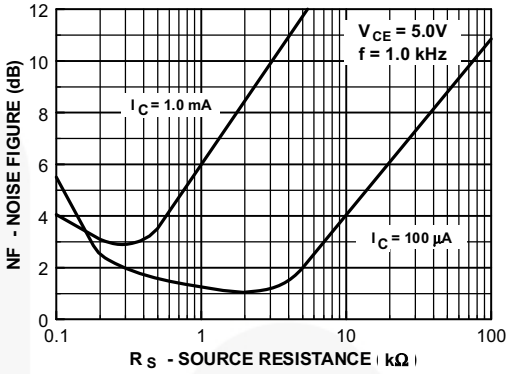


Figure 14. Noise Figure vs. Source Resistance

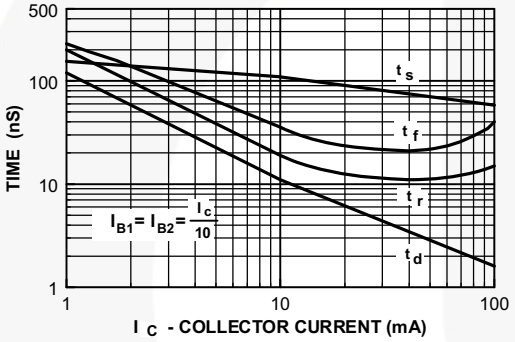


Figure 15. Switching Times vs. Collector Current

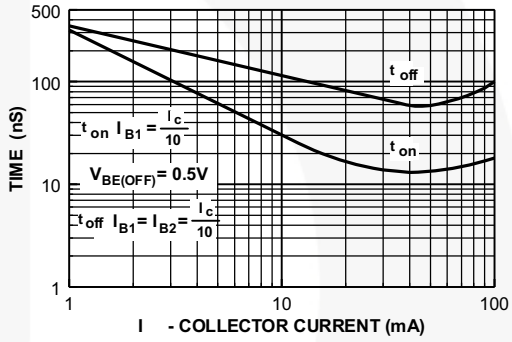


Figure 16. Turn-On and Turn-Off Times vs. Collector Current

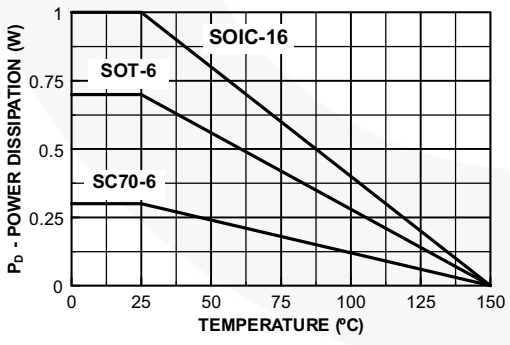


Figure 17. Power Dissipation vs. Ambient Temperature

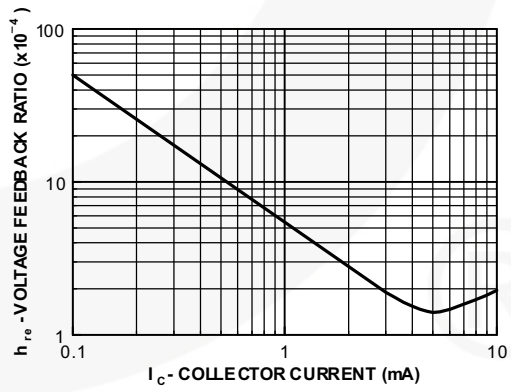


Figure 18. Voltage Feedback Ratio

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Typical Performance Characteristics (Continued)

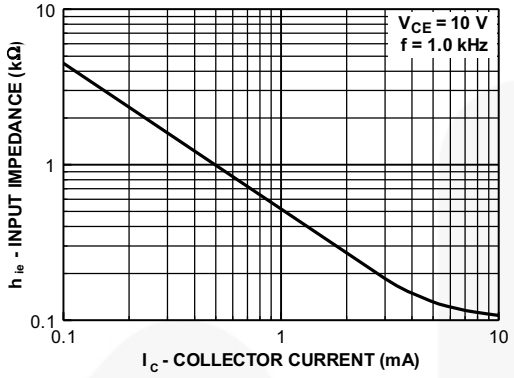


Figure 19. Input Impedance

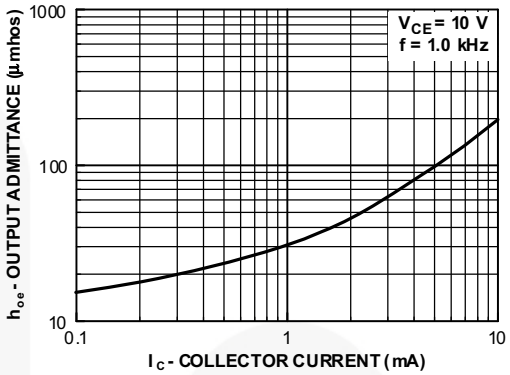


Figure 20. Output Admittance

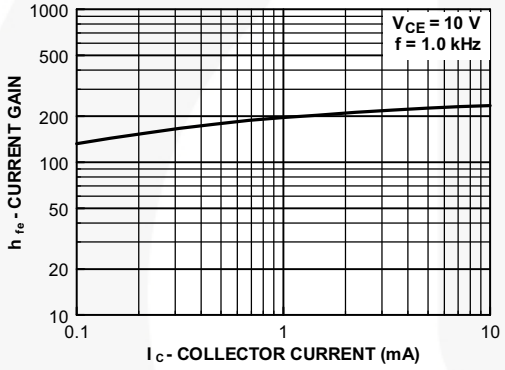


Figure 21. Current Gain

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Physical Dimensions

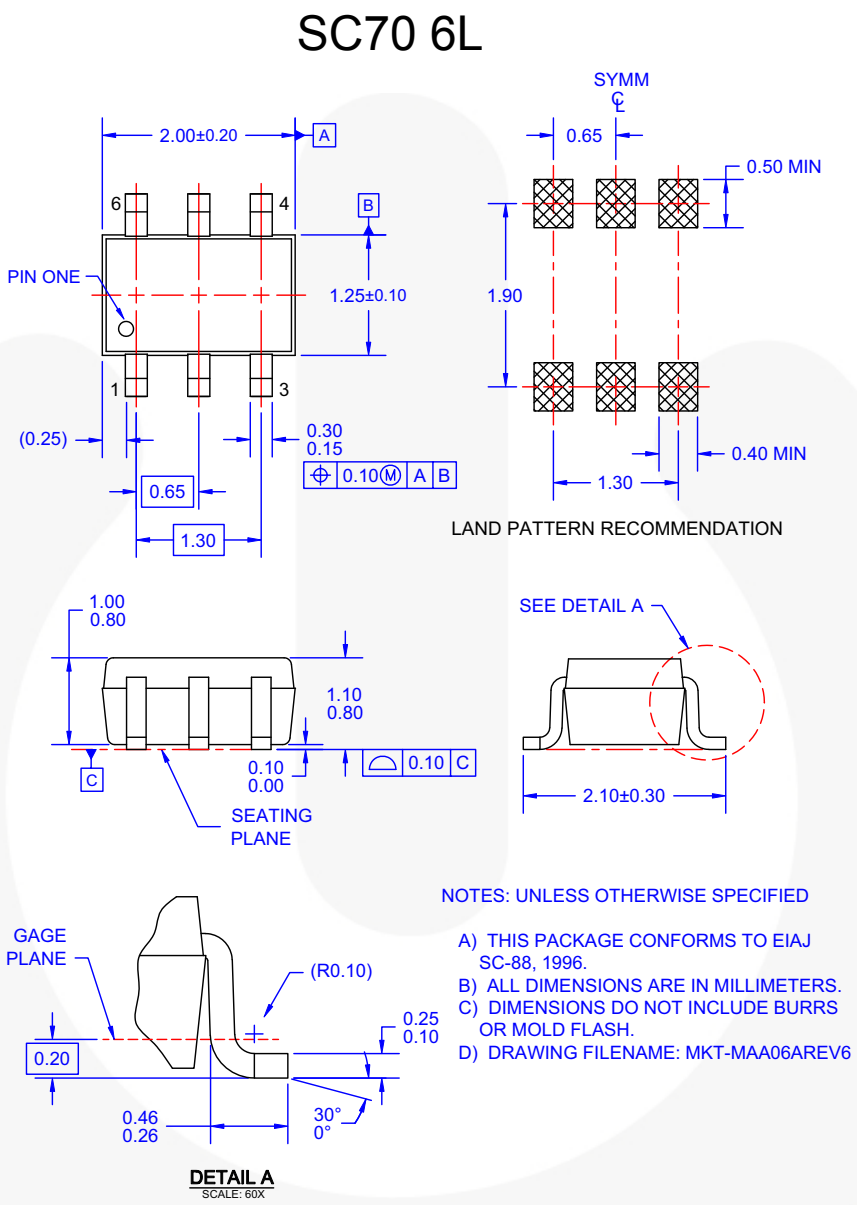


Figure 22. 6-LEAD, SC70, EIAJ SC-88, 1.25 MM WIDE (ACTIVE)

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Physical Dimensions (Continued)

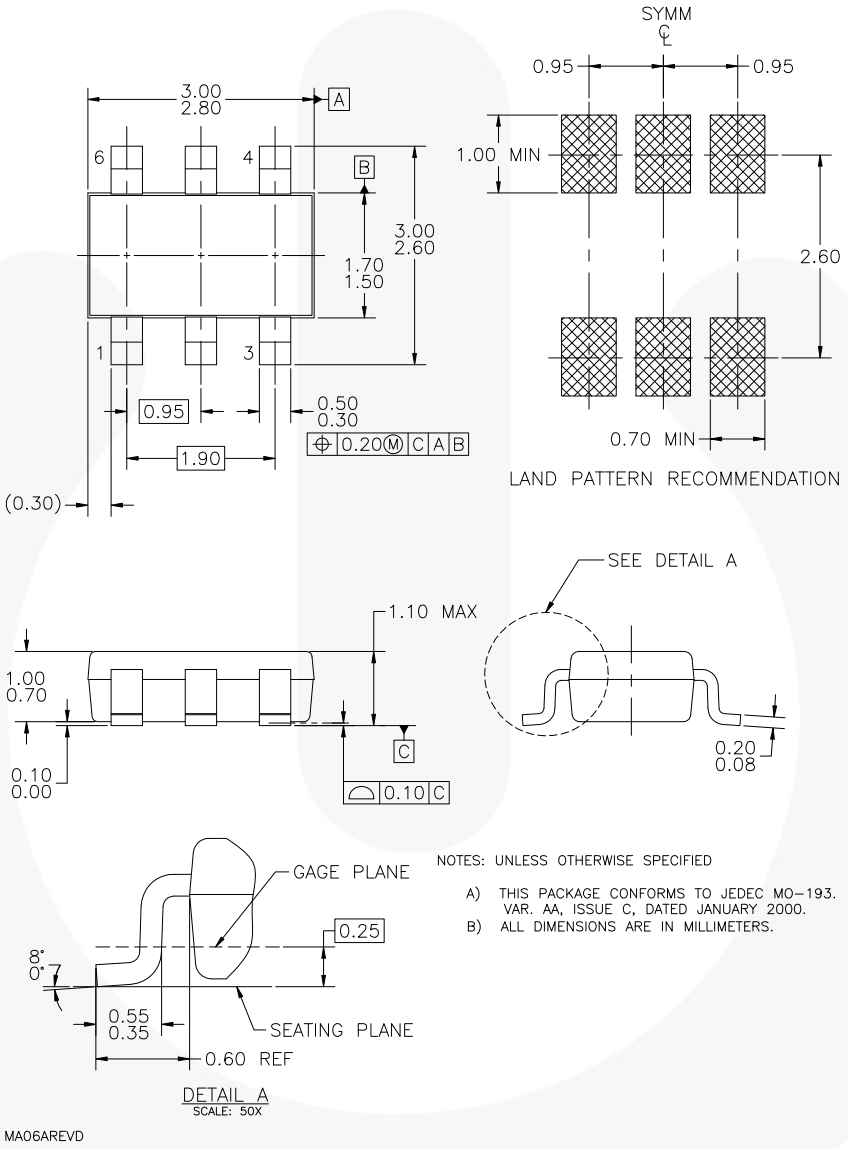


Figure 23. 6-LEAD, SUPERSOT-6, JEDEC MO-193, 1.6 MM WIDE (ACTIVE)

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Physical Dimensions (Continued)

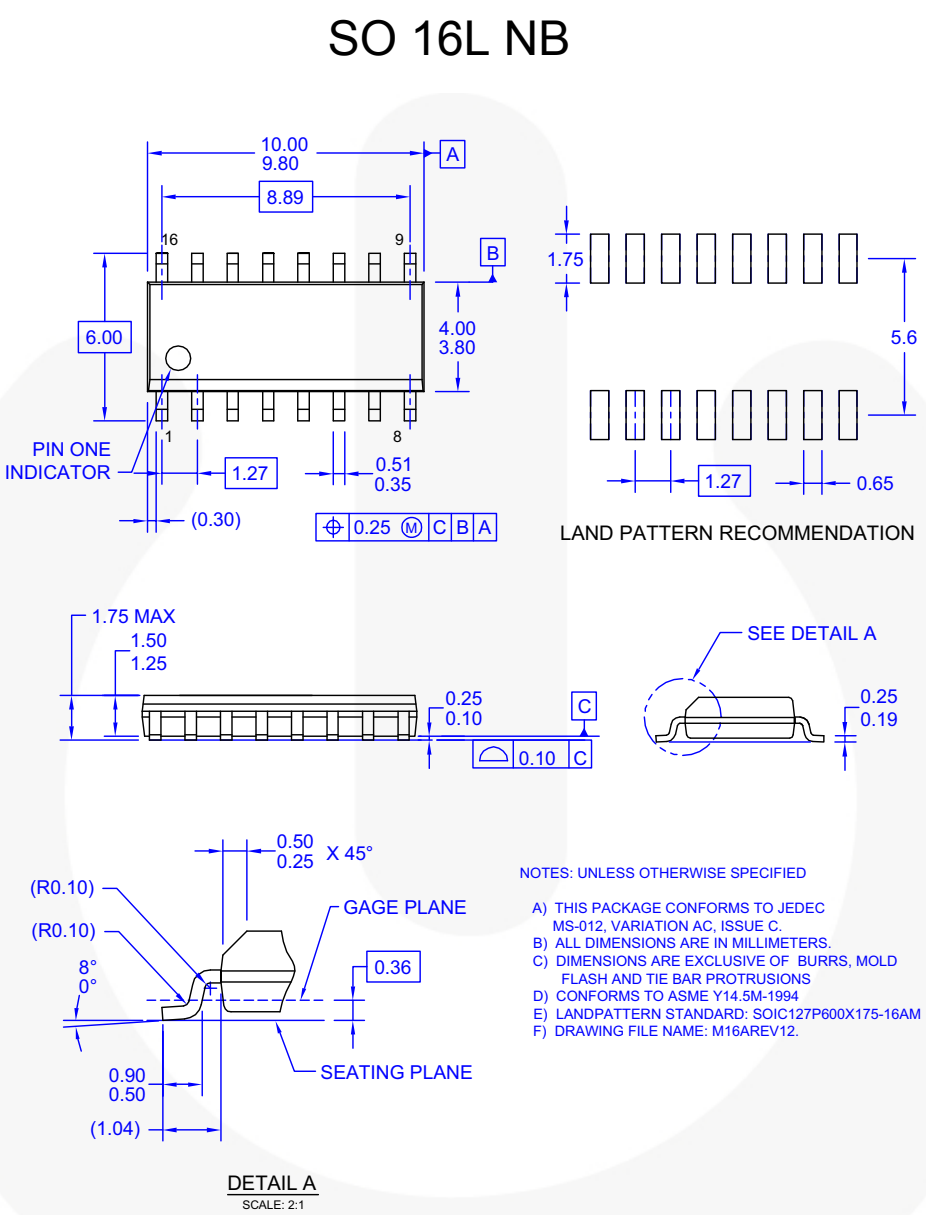


Figure 24. 16-LEAD, SOIC, JEDEC MS-012, 0.150 inch, NARROW BODY (ACTIVE)

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