FAIRCHILD

October 2015

FFB2222A / FMB2222A / MMPQ2222A
NPN Multi-Chip General-Purpose Amplifier

Description

This device is for use as a medium power amplifier and switch requiring collector currents up to 500 mA. Sourced from process 19.

Block Diagram

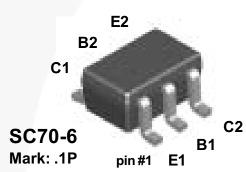


Figure 1. FFB2222A Device Package

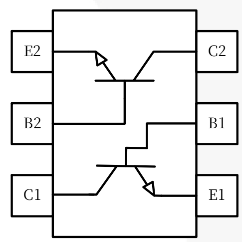


Figure 2. FFB2222A Internal Connection

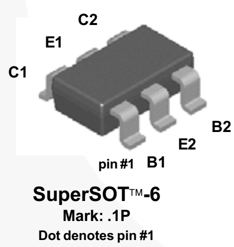


Figure 3. FMB2222A Device Package

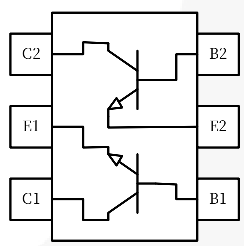


Figure 4. FMB2222A Internal Connection

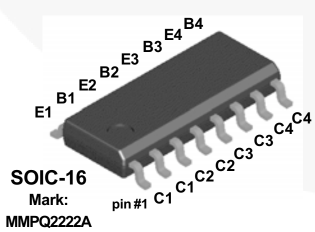


Figure 5. MMPQ2222A Device Package

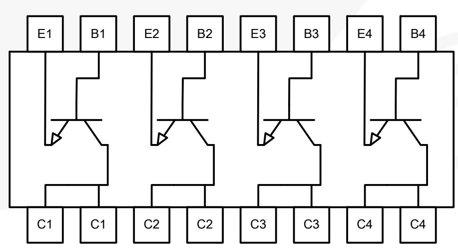


Figure 6. MMPQ2222A Internal Connection

Ordering Information

Part Number	Top Mark	Package	Packing Method
FFB2222A	.1P	SC70 6L	Tape and Reel
FMB2222A	.1P	SSOT 6L	Tape and Reel
MMPQ2222A	MMPQ2222A	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	45	V
V_{CBO}	Collector-Base Voltage	75	V
V_{EBO}	Emitter-Base Voltage	5.0	V
I_C	Collector Current - Continuous	500	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
		FFB2222A	FMB2222A	MMPQ2222A	
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 Dies			125	
	Thermal Resistance, Junction-to-Ambient, Each Die			240	

Note:

2. PCB size: FR-4, 76 mm x 114 mm x 1.57 mm (3.0 inch x 4.5 inch x 0.062 inch) with minimum land pattern size.

Electrical Characteristics

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage(3)	I_C = 10 mA, I_B = 0	40			V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	I_C = 10 μA, I_E = 0	75			V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	I_E = 10 μA, I_C = 0	5.0			V
I_{CBO}	Collector Cut-Off Current	V_{CB} = 60 V, I_E = 0			10	nA
I_{EBO}	Emitter Cut-Off Current	V_{EB} = 3.0 V, I_C = 0			10	nA
h_{FE}	DC Current Gain	I_C = 0.1 mA, V_{CE} = 10 V	35			
		I_C = 1.0 mA, V_{CE} = 10 V	50			
		I_C = 10 mA, V_{CE} = 10 V	75			
		I_C = 150 mA, V_{CE} = 10 V(3)	100		300	
		I_C = 150 mA, V_{CE} = 1.0 V(3)	50			
		I_C = 500 mA, V_{CE} = 10 V(3)	40			
$V_{CE}(sat)$	Collector-Emitter Saturation Voltage(3)	I_C = 150 mA, I_B = 15 mA			0.3	V
		I_C = 500 mA, I_B = 50 mA			1.0	
$V_{BE}(sat)$	Base-Emitter Saturation Voltage(3)	I_C = 150 mA, I_B = 15 mA			1.2	V
		I_C = 500 mA, I_B = 50 mA			2.0	
f_T	Current Gain - Bandwidth Product	I_C = 20 mA, V_{CE} = 20 V, f = 100 MHz		300		MHz
C_{obo}	Output Capacitance	V_{CB} = 10 V, I_E = 0, f = 100 kHz		4.0		pF
C_{ibo}	Input Capacitance	V_{EB} = 0.5 V, I_C = 0, f = 100 kHz		20		pF
NF	Noise Figure	I_C = 100 μA, V_{CE} = 10 V, R_S = 1.0 kΩ, f = 1.0 kHz		2.0		dB
t_d	Delay Time	V_{CC} = 30 V, $V_{BE(OFF)}$ = 0.5 V, I_C = 150 mA, I_{B1} = 15 mA		8		ns
t_r	Rise Time			20		ns
t_s	Storage Time	V_{CC} = 30 V, I_C = 150 mA, I_{B1} = I_{B2} = 15 mA		180		ns
t_f	Fall Time			40		ns

Note:

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

Typical Performance Characteristics

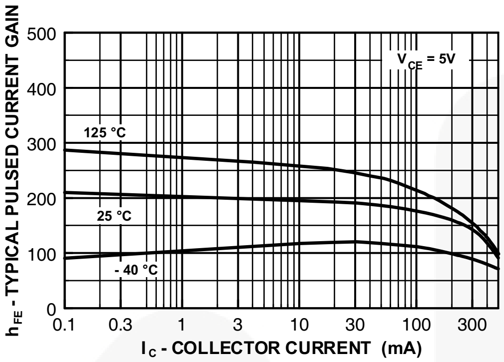


Figure 7. Typical Pulsed Current Gain vs. Collector Current

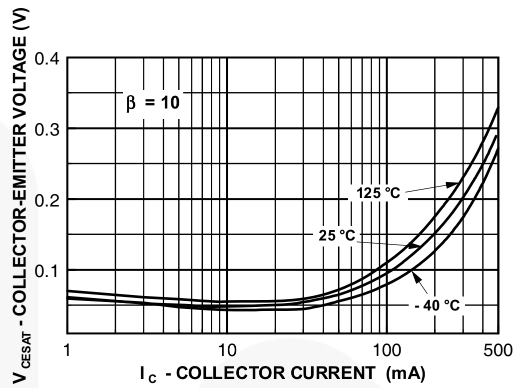


Figure 8. Collector-Emitter Saturation Voltage vs. Collector Current

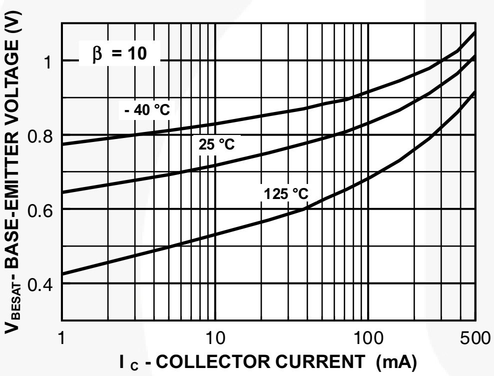


Figure 9. Base-Emitter Saturation Voltage vs. Collector Current

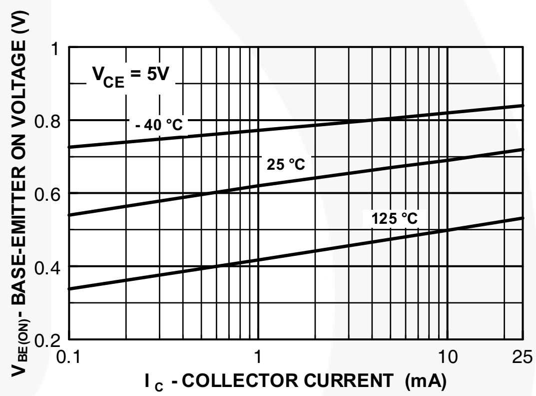


Figure 10. Base-Emitter On Voltage vs. Collector Current

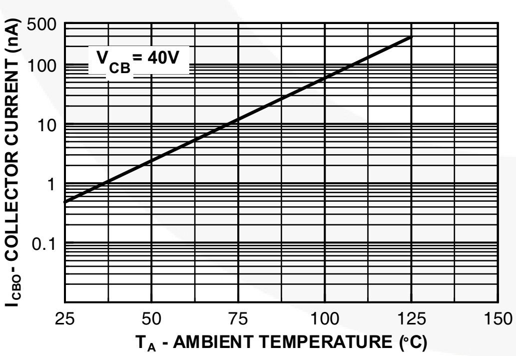


Figure 11. Collector Cut-Off Current vs. Ambient Temperature

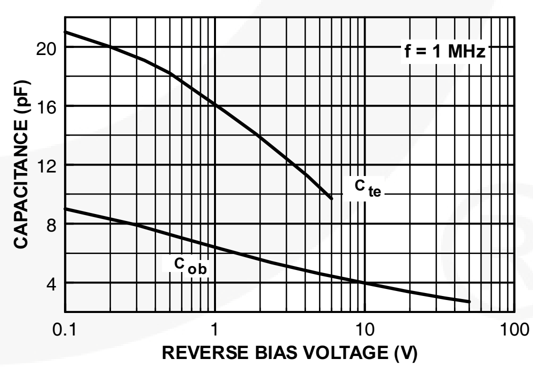


Figure 12. Emitter Transition and Output Capacitance vs. Reverse Bias Voltage

Typical Performance Characteristics (Continued)

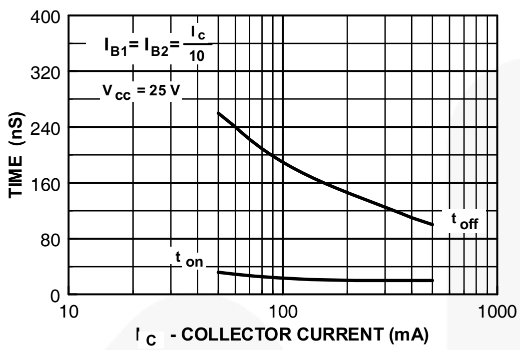


Figure 13. Turn-On and Turn-Off Times vs. Collector Current

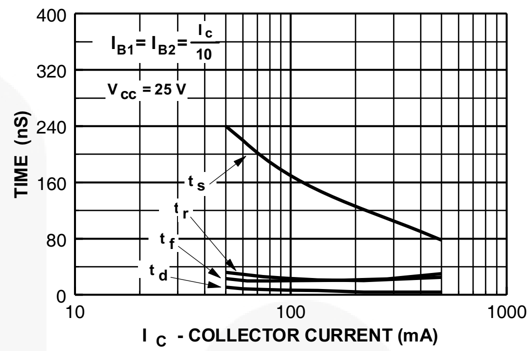


Figure 14. Switching Time vs. Collector Current

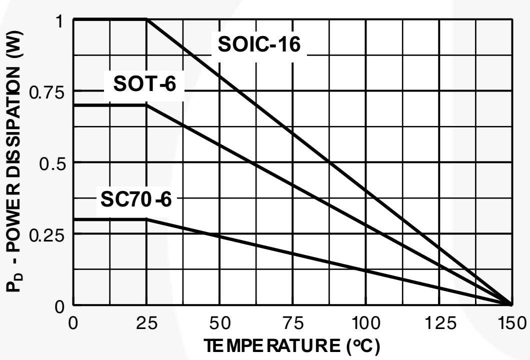


Figure 15. Power Dissipation vs. Ambient Temperature

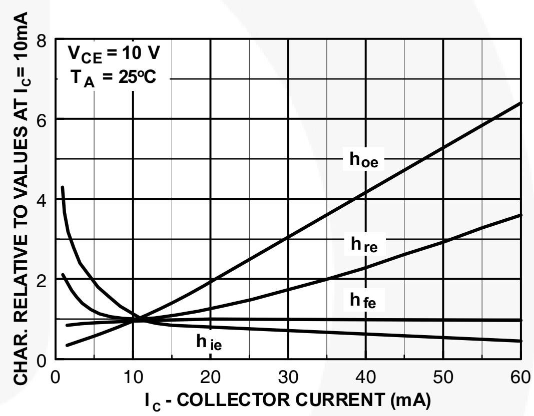


Figure 16. Common Emitter Characteristics

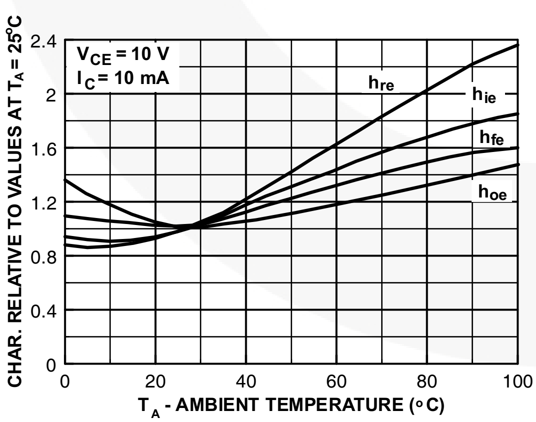


Figure 17. Common Emitter Characteristics

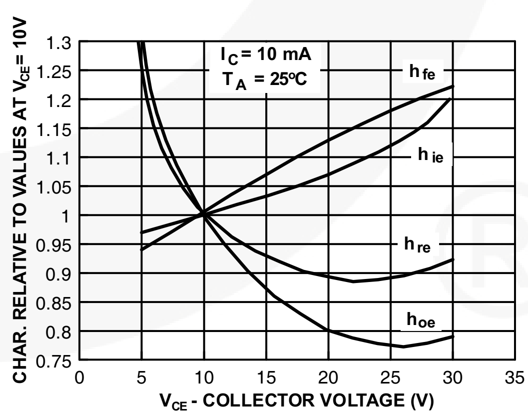


Figure 18. Common Emitter Characteristics

Test Circuits

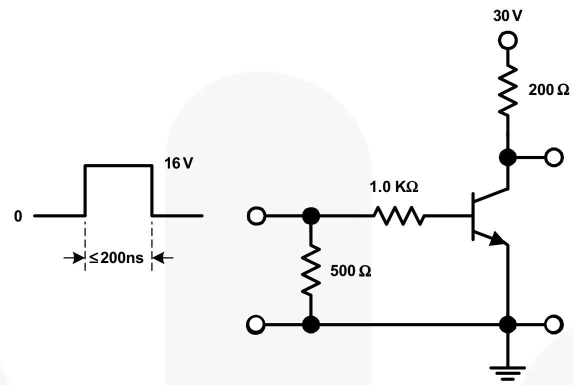


Figure 19. Saturated Turn-On Switching Time

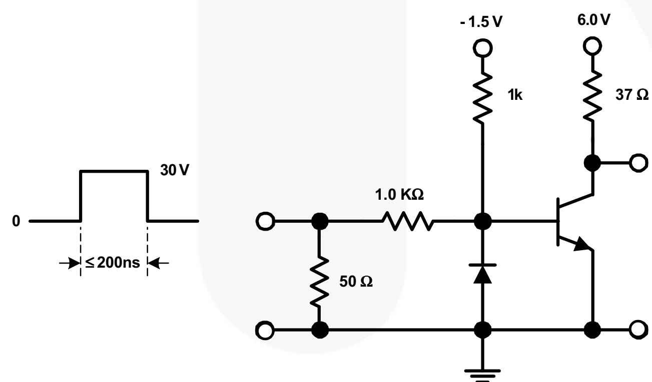
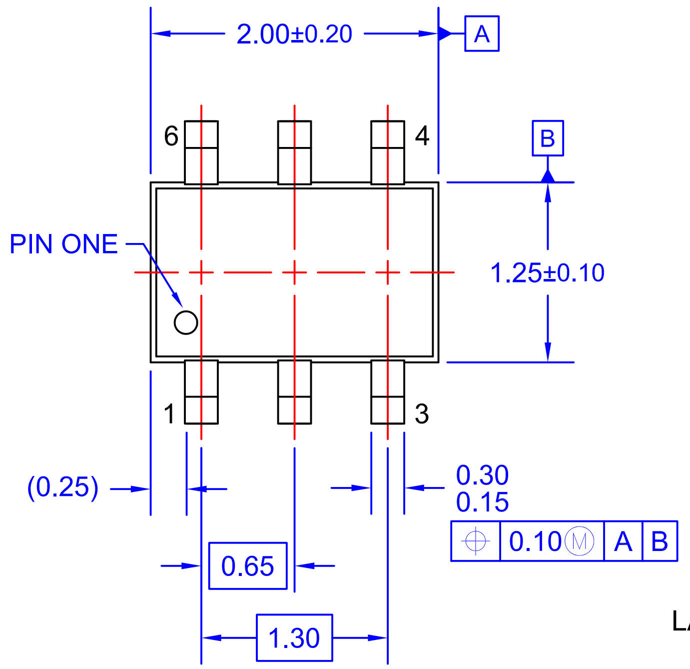
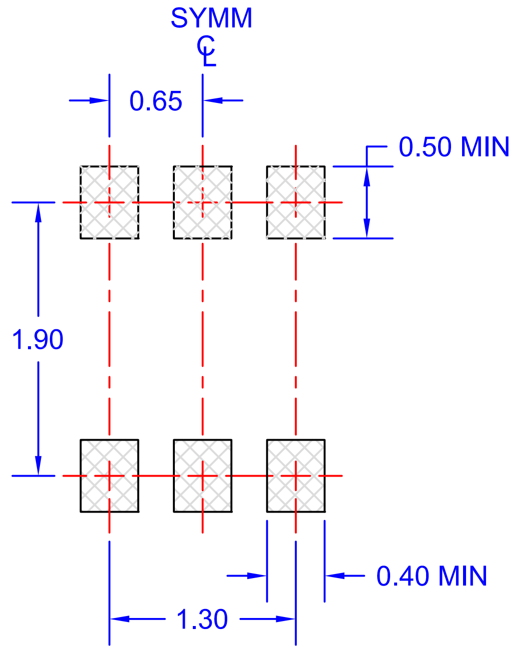
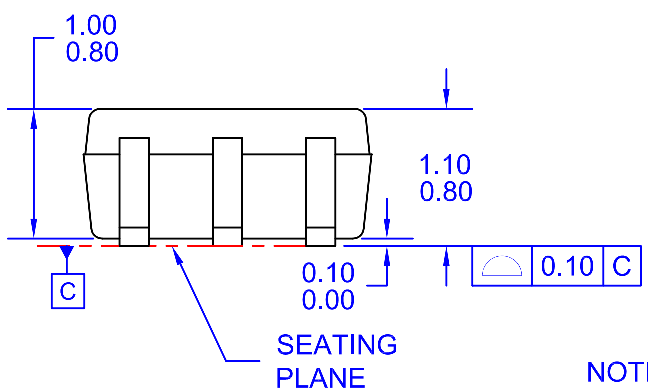


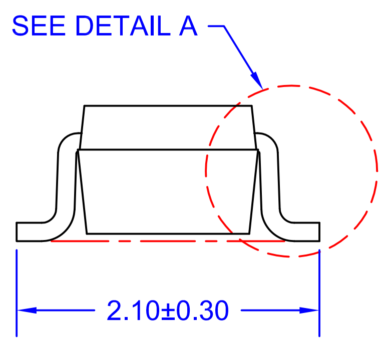
Figure 20. Saturated Turn-Off Switching Time





LAND PATTERN RECOMMENDATION





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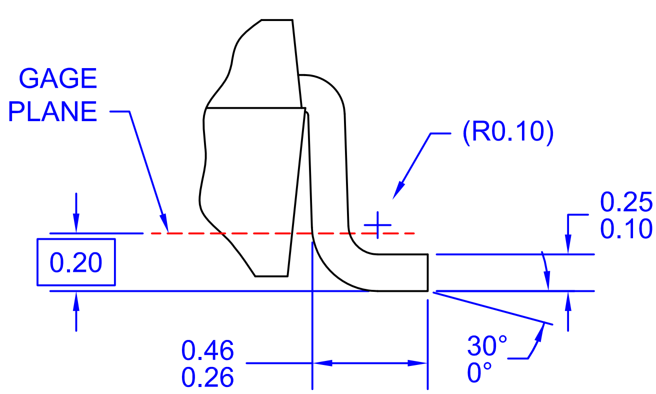
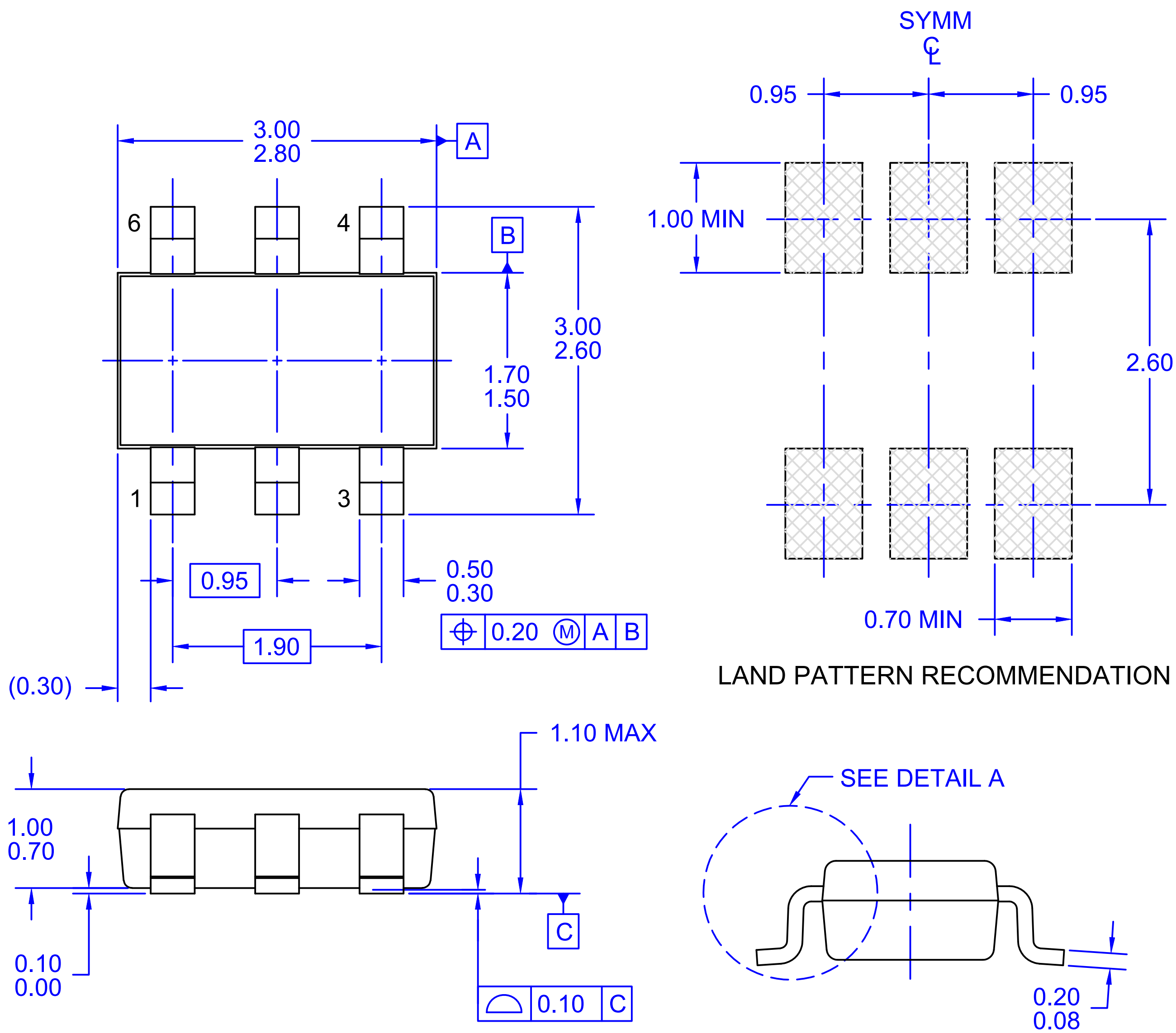
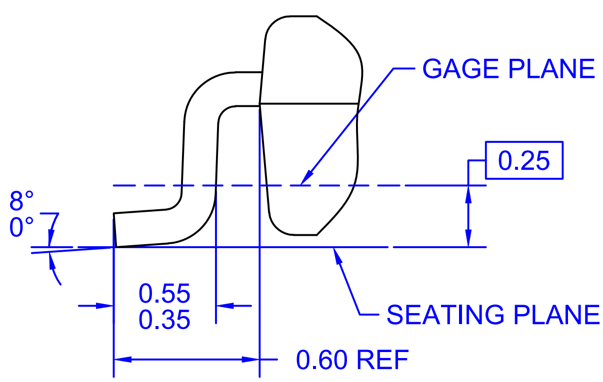
- D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009
- E) DRAWING FILENAME: MKT-MAA06AREV7



DETAIL A
SCALE: 60X





DETAIL A
SCALE: 50X

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D) DRAWING FILE NAME: MKT-MA06AREV5

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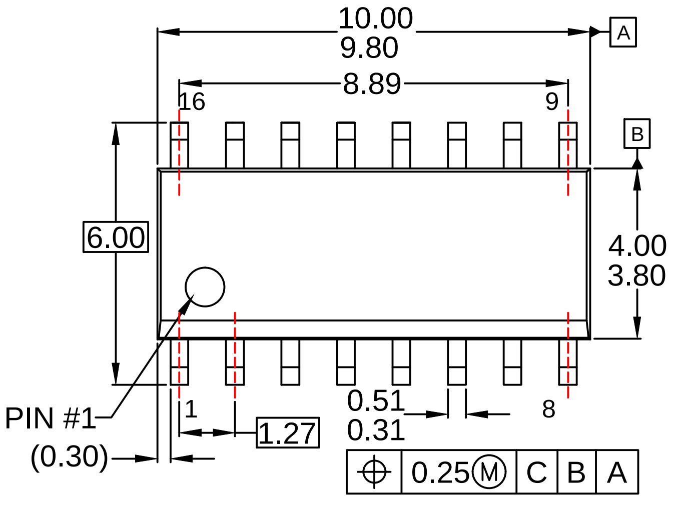
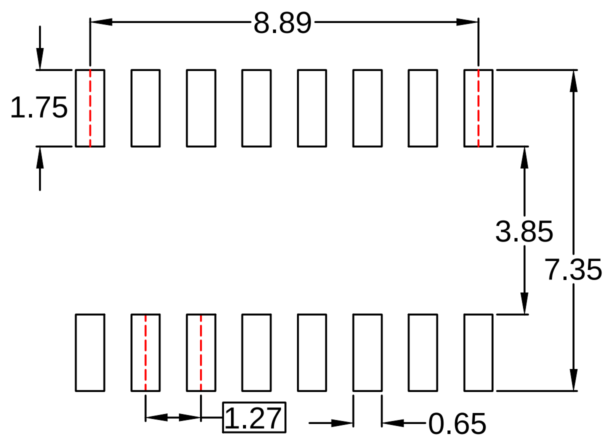
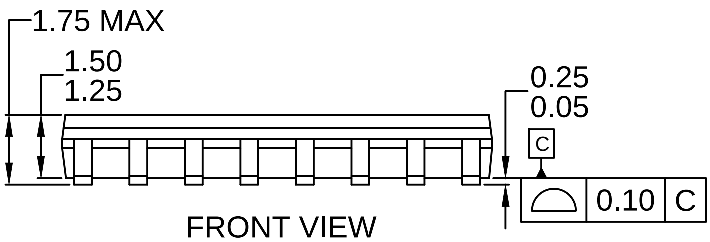


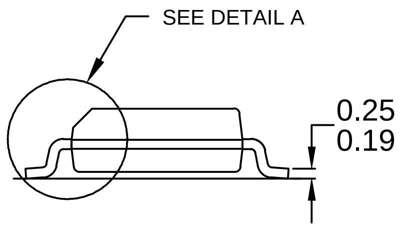
TOP VIEW

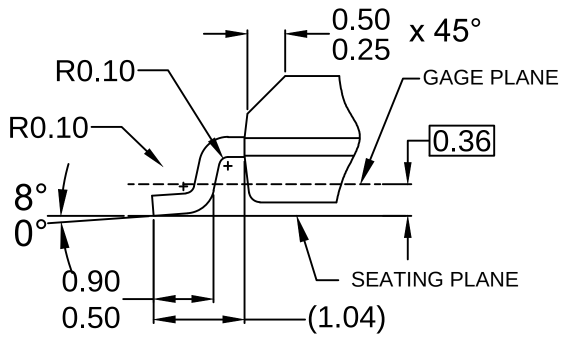


LAND PATTERN RECOMMENDATION



FRONT VIEW





DETAIL A
SCALE: 2:1

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F) DRAWING FILE NAME: M16AREV13.

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Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

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