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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

SC70-6
Mark: .1P
pin #1
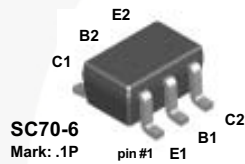
Figure 1. FFB2222A Device Package
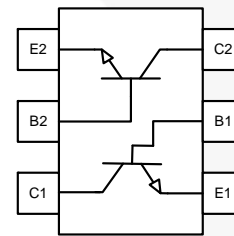
Figure 2. FFB2222A Internal Connection

SuperSOT™-6
Mark: .1P
Dot denotes pin #1
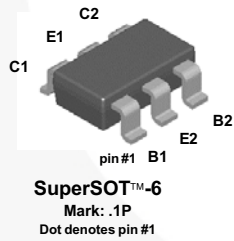
Figure 3. FMB2222A Device Package
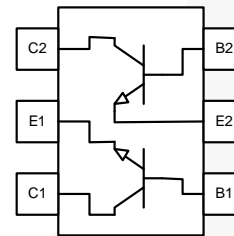
Figure 4. FMB2222A Internal Connection

SOIC-16
Mark:
MMPQ2222A
pin #1
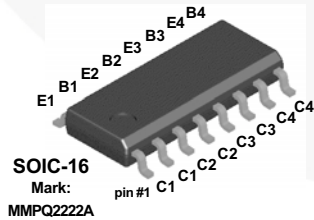
Figure 5. MMPQ2222A Device Package
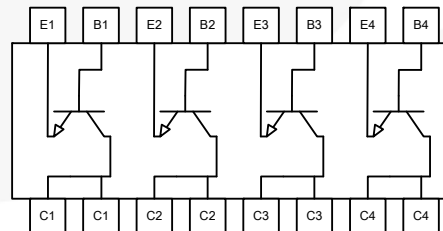
Figure 6. MMPQ2222A Internal Connection

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FFB2222A / FMB2222A / MMPQ2222A Rev. 1.4

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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. FFB2222A	Max. FMB2222A	Max. MMPQ2222A	Unit
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%.

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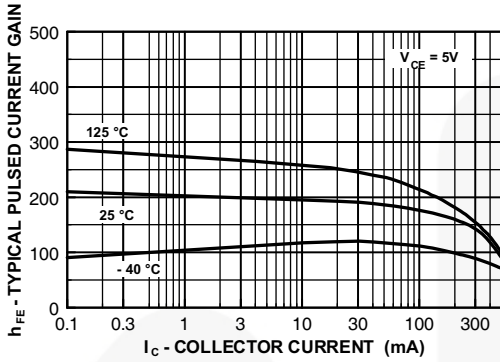
Typical Performance Characteristics

Figure 7. Typical Pulsed Current Gain vs. Collector Current
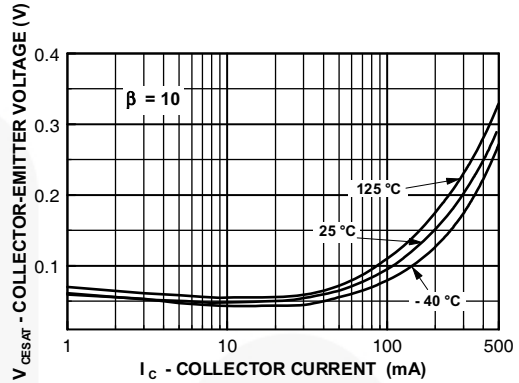

Figure 8. Collector-Emitter Saturation Voltage vs. Collector Current
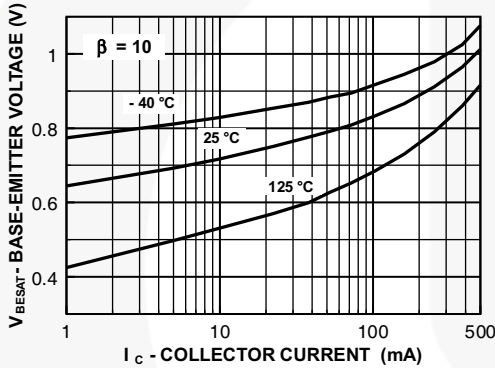

Figure 9. Base-Emitter Saturation Voltage vs. Collector Current
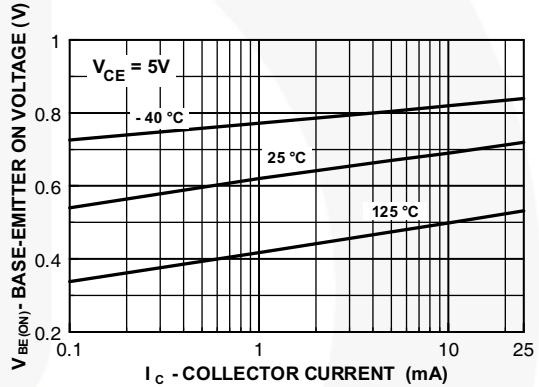

Figure 10. Base-Emitter On Voltage vs. Collector Current
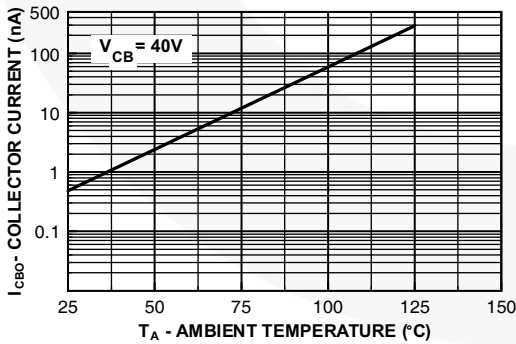
Figure 11. Collector Cut-Off Current vs. Ambient Temperature
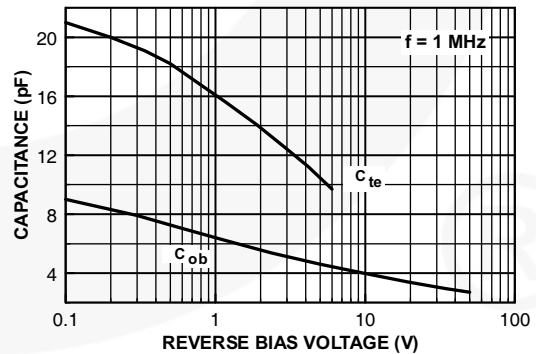
Figure 12. Emitter Transition and Output Capacitance vs. Reverse Bias Voltage

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
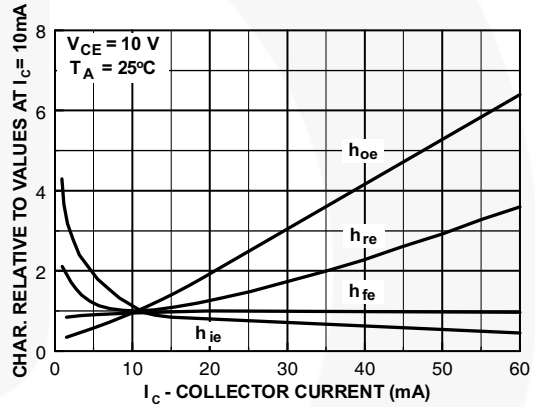
Figure 16. Common Emitter Characteristics
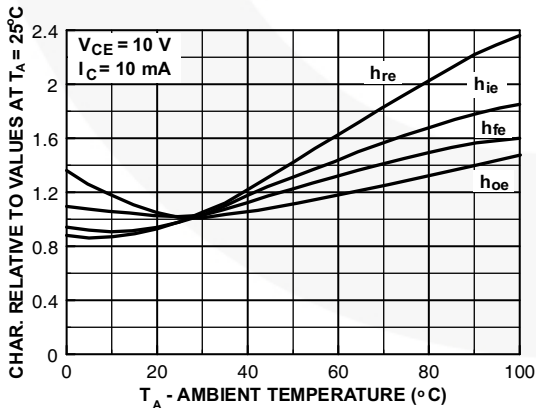
Figure 17. Common Emitter Characteristics
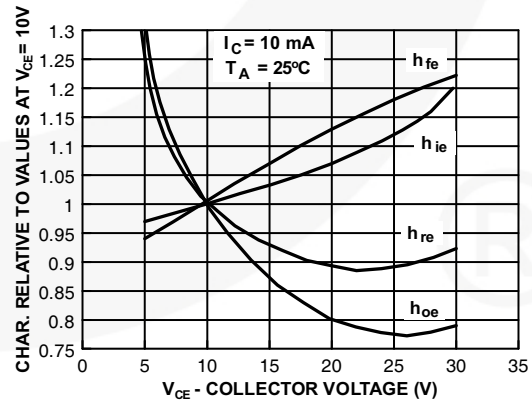
Figure 18. Common Emitter Characteristics

Test Circuits
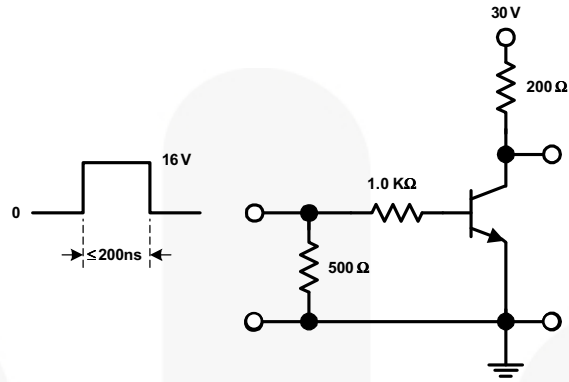
Figure 19. Saturated Turn-On Switching Time
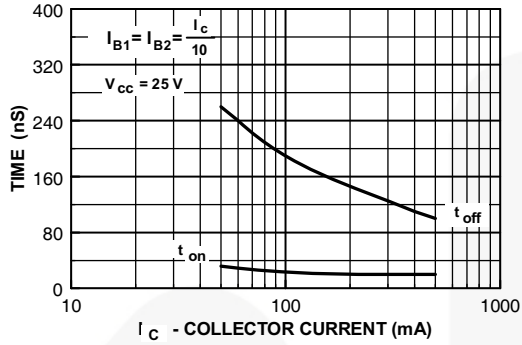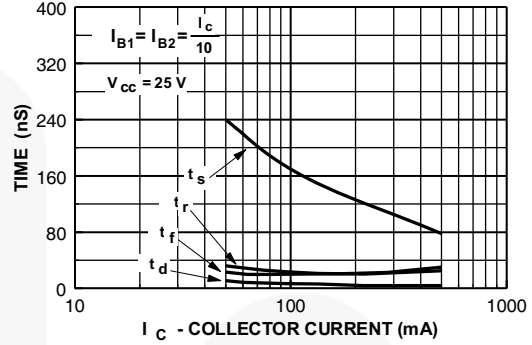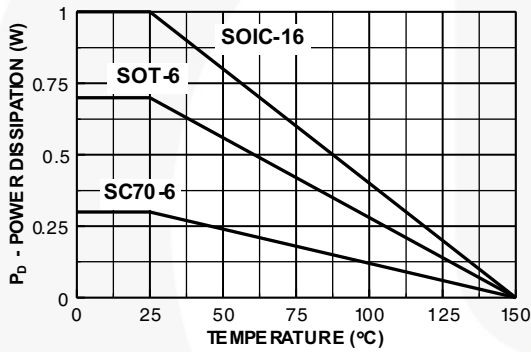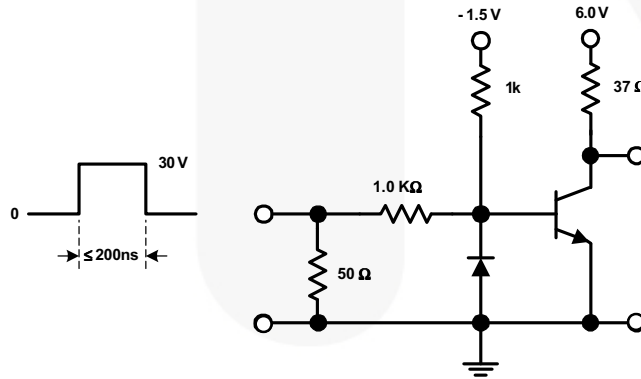

Figure 20. Saturated Turn-Off Switching Time
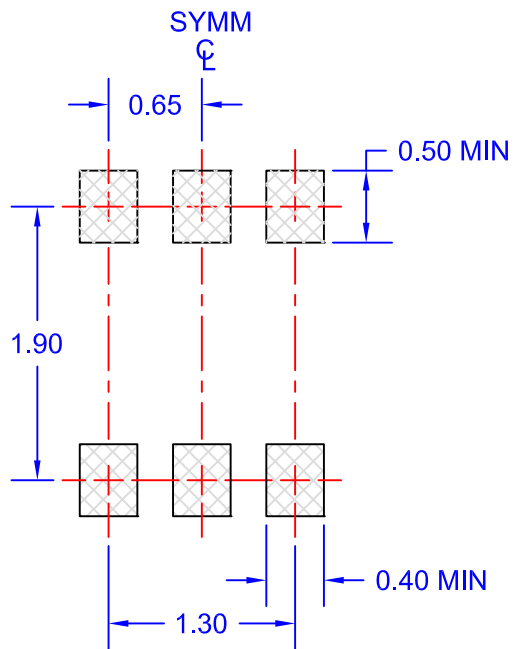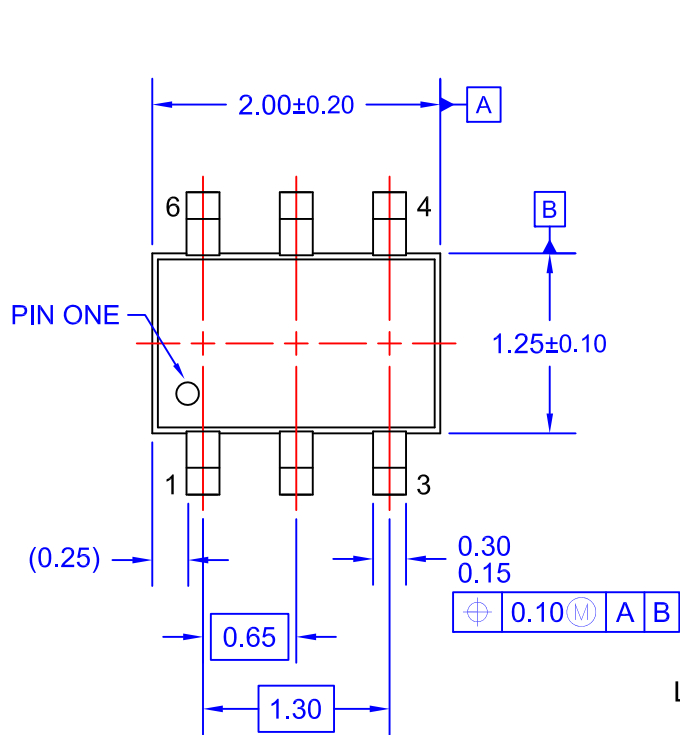
2.00±0.20   A

6   4   B

PIN ONE

1.25±0.10

1   3

(0.25)   0.30
         0.15

0.65   ⊕ 0.10 Ⓜ A B

1.30

SYMM
₵

0.65

0.50 MIN

1.90

0.40 MIN

1.30

LAND PATTERN RECOMMENDATION

1.00
0.80

1.10
0.80

0.10
0.00

⌒ 0.10 C

C

SEATING
PLANE

SEE DETAIL A

2.10±0.30
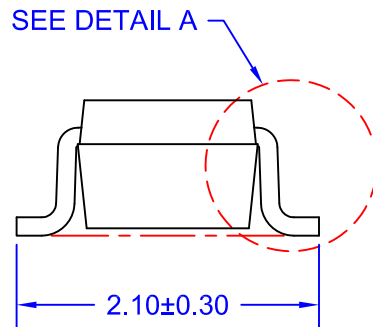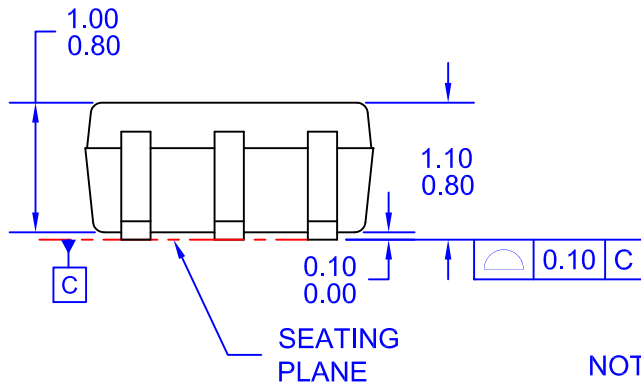
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   ASME Y14.5M-2009
E) DRAWING FILENAME: MKT-MAA06AREV7

GAGE
PLANE

(R0.10)

0.25
0.10

0.20

0.46   30°
0.26   0°

DETAIL A
SCALE: 60X

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A

3.00
2.80

6 4

B

3.00
2.60

1.70
1.50

1 3

0.95

0.50
0.30

1.90

⊕ | 0.20 Ⓜ | A | B

(0.30)

SYMM
C̸L

0.95   0.95

1.00 MIN

2.60

0.70 MIN

LAND PATTERN RECOMMENDATION

1.10 MAX

1.00
0.70

0.10
0.00

C

⌒ | 0.10 | C

SEE DETAIL A

0.20
0.08

GAGE PLANE

0.25

8°
0°

0.55
0.35

SEATING PLANE

0.60 REF
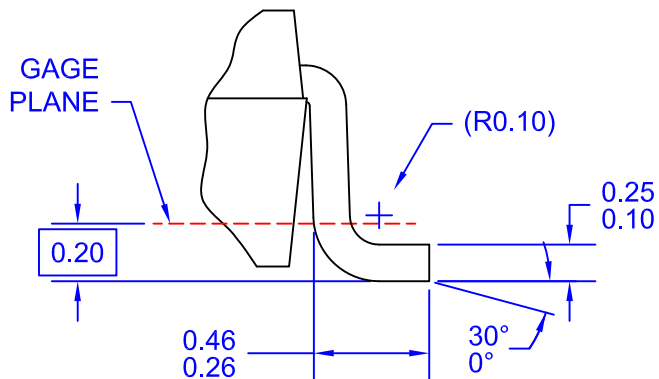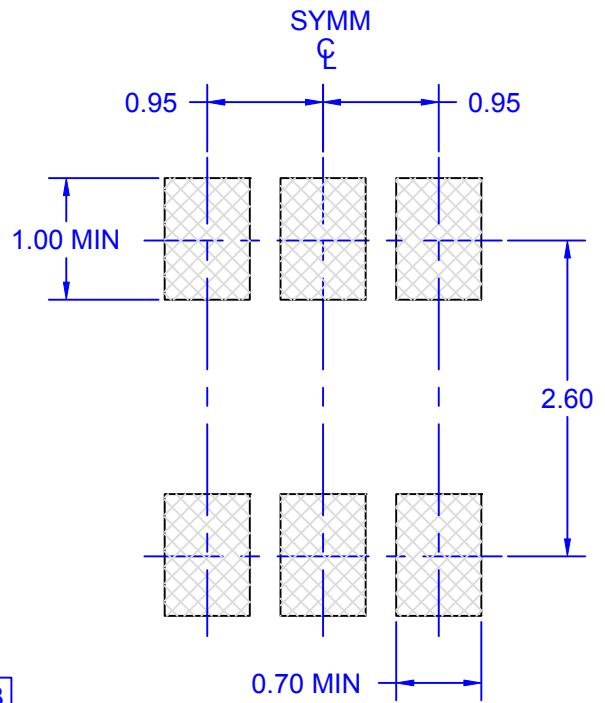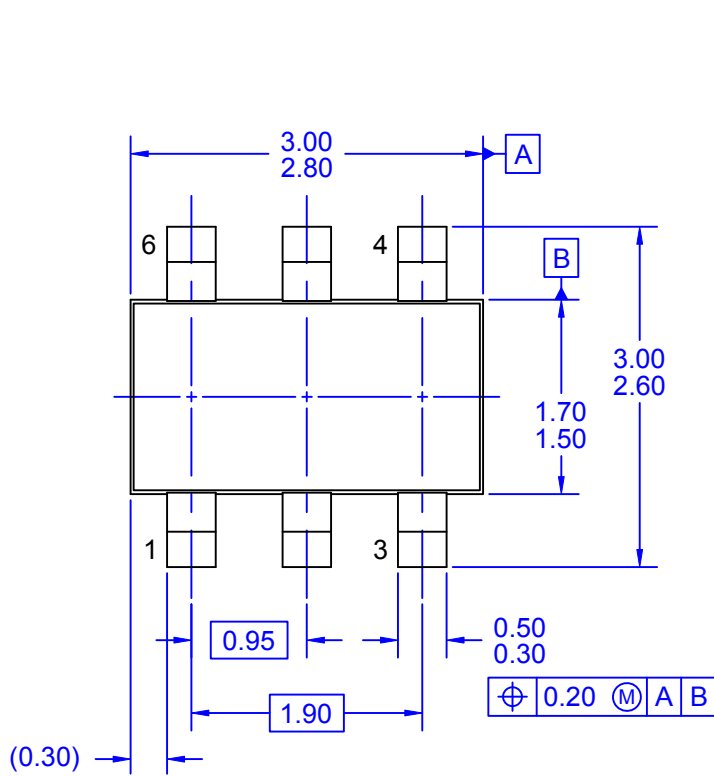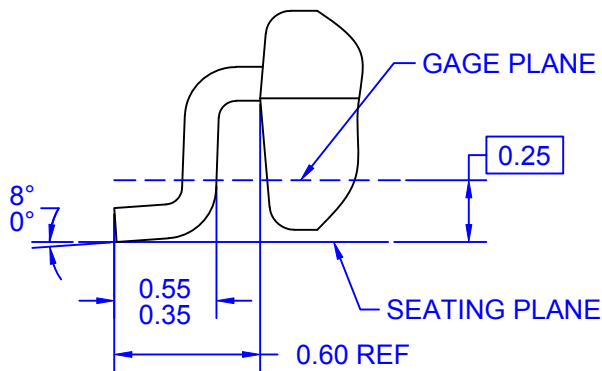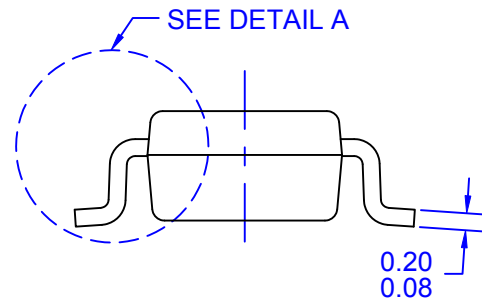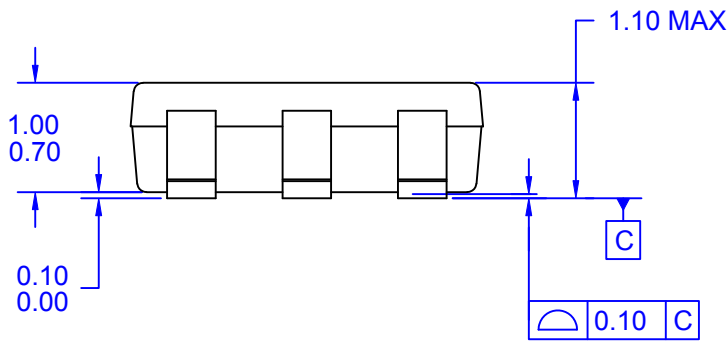
DETAIL A
SCALE: 50X

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10.00
9.80

A

8.89

16   9   B

6.00

4.00
3.80

PIN #1

1

0.51
0.31

8

(0.30)

1.27

⊕ 0.25 Ⓜ C B A

TOP VIEW

8.89

1.75

3.85

7.35

1.27   0.65

LAND PATTERN RECOMMENDATION

1.75 MAX

1.50
1.25

0.25
0.05

C

0.10 C

FRONT VIEW

SEE DETAIL A

0.25
0.19

0.50
0.25 x 45°

R0.10

GAGE PLANE

R0.10

0.36

8°
0°

0.90
0.50

SEATING PLANE

(1.04)
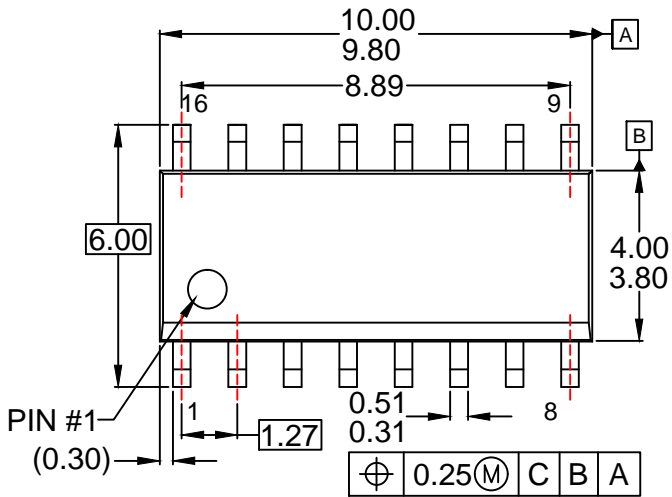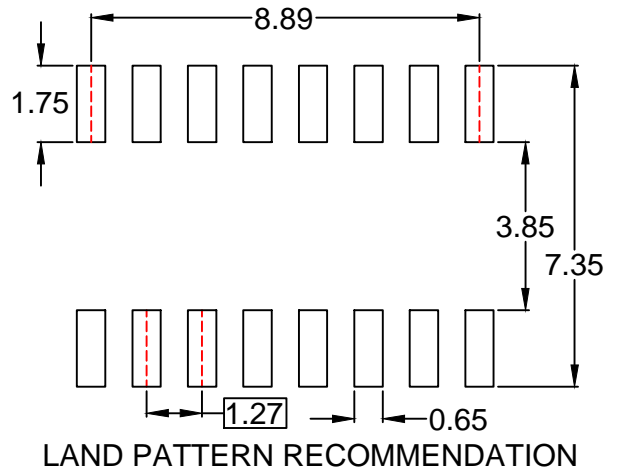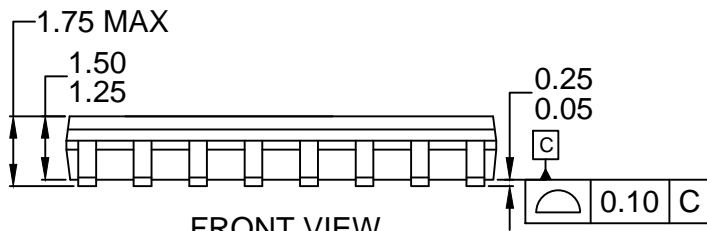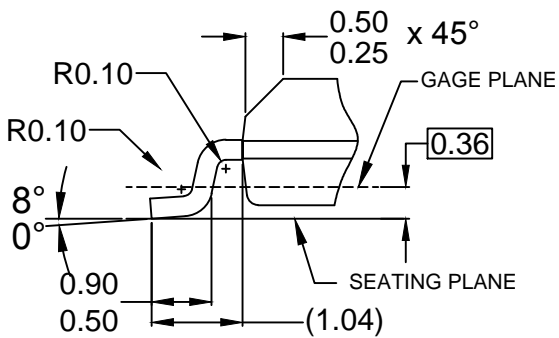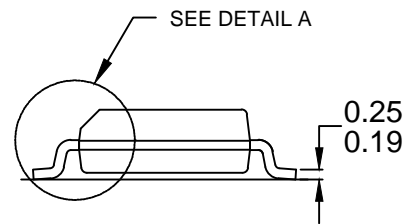
DETAIL A
SCALE: 2:1

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Datasheet Identification	Product Status	Definition
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.

Rev. I77