NPN Multi-Chip General-Purpose Amplifier

FMB2222A, MMPQ2222A

Description

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

ABSOLUTE MAXIMUM RATINGS (Note 1)

(T_A = 25 °C, unless otherwise noted)

Symbol	Rating	Value	Unit
V_{CEO}	Collector - Emitter Voltage	40	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

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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

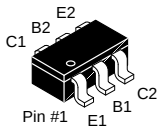
THERMAL CHARACTERISTICS (Notes 2)

(T_A = 25 °C, unless otherwise noted)

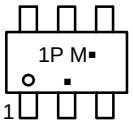
Symbol	Characteristic	Max		Unit
		FMB2222A	MMPQ2222A	
P_D	Power Dissipation	700	1,000	mW
	Derate Above 25 °C	5.6	8.0	mW/°C
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	180	–	°C/W
	Thermal Resistance, Junction-to-Ambient, Effective 4 Dies	–	125	
	Thermal Resistance, Junction-to-Ambient, Each Die	–	240	

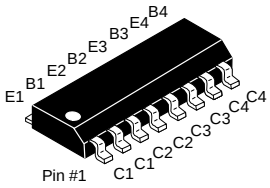
2. PCB size: FR-4, 76 mm x 114 mm x 1.57 mm (3.0 inch x 4.5 inch x 0.062 inch) with minimum land pattern size.

MARKING DIAGRAM



TSOT23 6-Lead
CASE 419AG



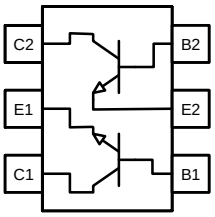


SOIC-16
CASE 751BG

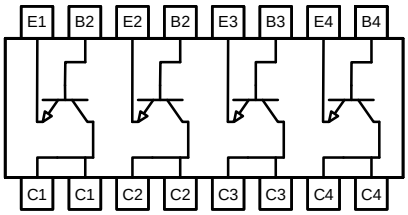
1P, MMPQ2222A = Specific Device Code
M = Date Code
▪ = Pb-Free Package
A = Assembly Site
WL = Wafer Lot Number
Y = Year of Production
WW = Work Week Number

(Note: Microdot may be in either location)

INTERNAL CONNECTIONS



FMB2222A



MMPQ2222A

ORDERING INFORMATION

Device	Package	Shipping†
FMB2222A	TSOT23 (Pb-Free, Halide Free)	3000 / Tape & Reel
MMPQ2222A	SOIC-16 (Pb-Free, Halide Free)	2500 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

ELECTRICAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage (Note 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 (Note 3)	100	–	300	
		I_C = 150 mA, V_{CE} = 1.0 V (Note 3)	50	–	–	
		I_C = 500 mA, V_{CE} = 10 V (Note 3)	40	–	–	
V_{CE}(sat)	Collector-Emitter Saturation Voltage (Note 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 (Note 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

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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

TYPICAL PERFORMANCE CHARACTERISTICS

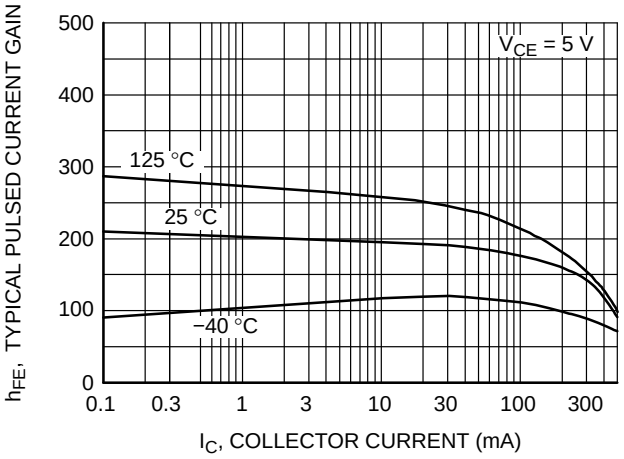


Figure 1. Typical Pulsed Current Gain vs. Collector Current

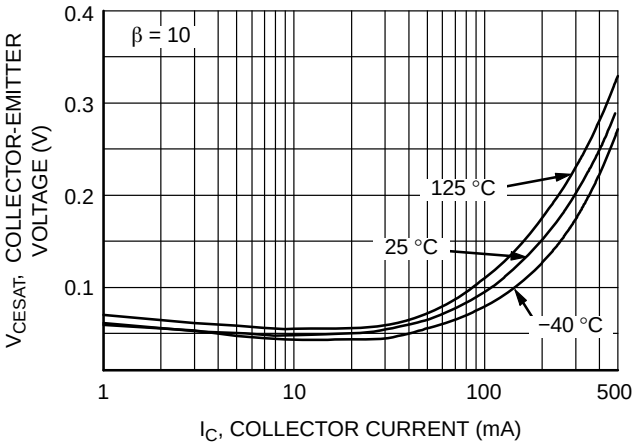


Figure 2. Collector-Emitter Saturation Voltage vs. Collector Current

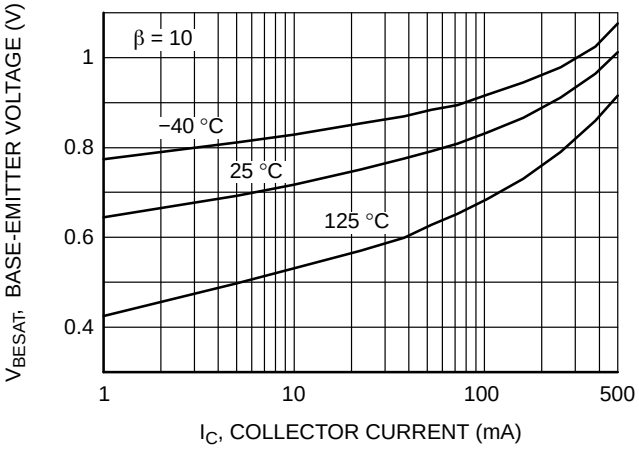


Figure 3. Base-Emitter Saturation Voltage vs. Collector Current

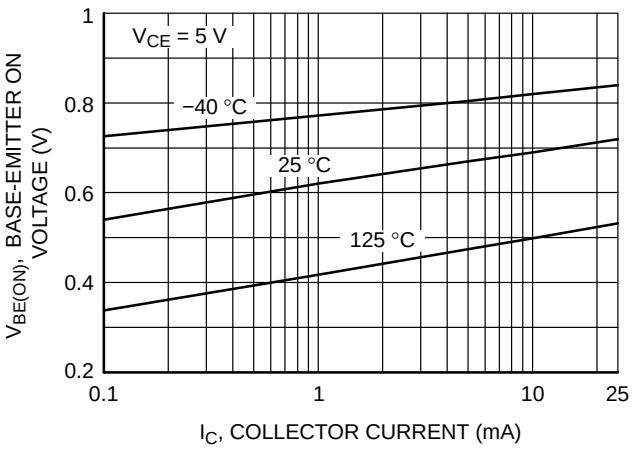


Figure 4. Base-Emitter On Voltage vs. Collector Current

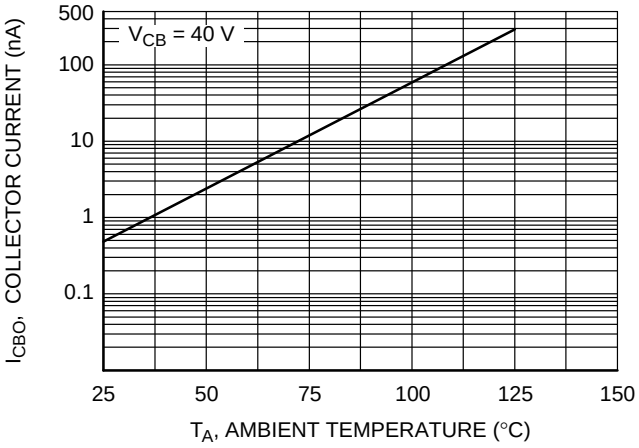


Figure 5. Collector Cut-Off Current vs. Ambient Temperature

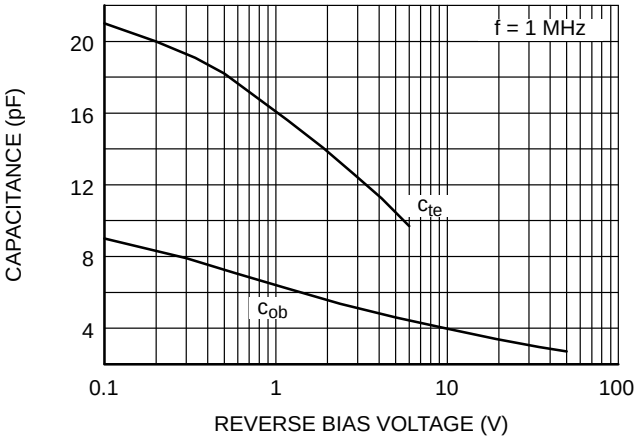


Figure 6. Emitter Transition and Output Capacitance vs. Reverse Bias Voltage

TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)

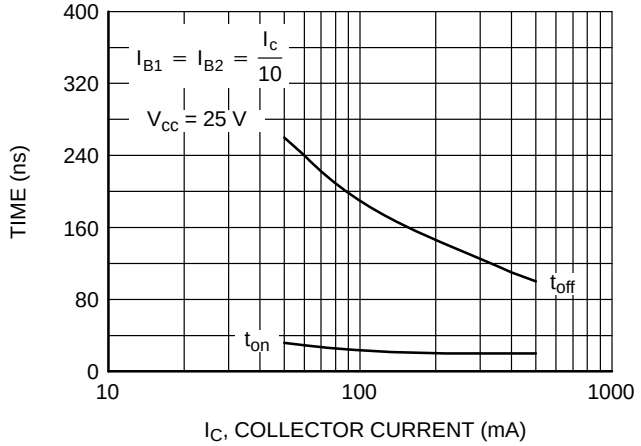


Figure 7. Turn-On and Turn-Off Times vs. Collector Current

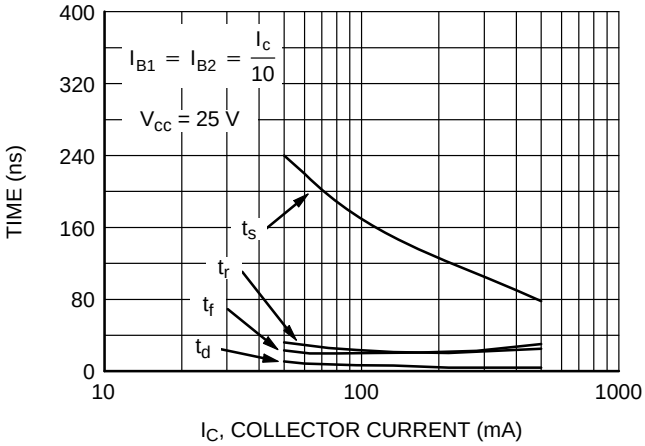


Figure 8. Switching Time vs. Collector Current

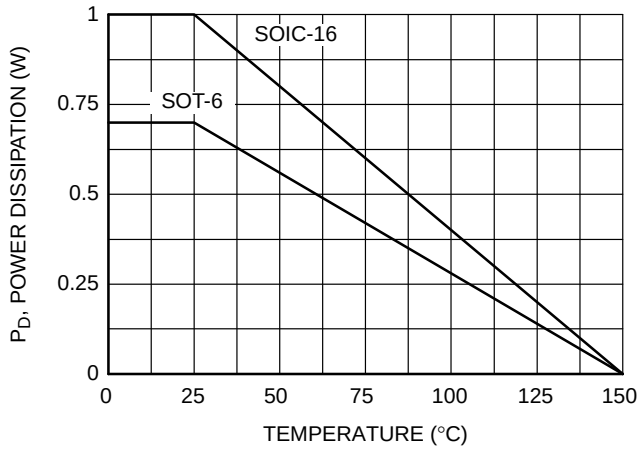


Figure 9. Power Dissipation vs. Ambient Temperature

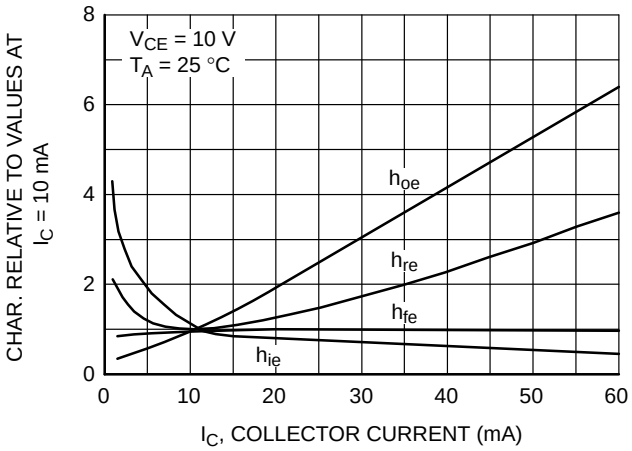


Figure 10. Common Emitter Characteristics

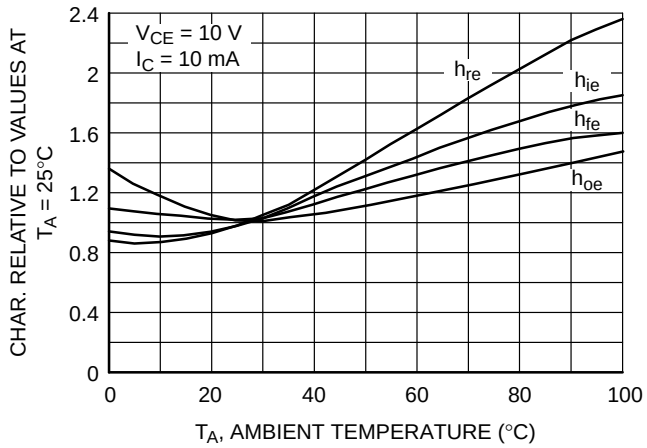


Figure 11. Common Emitter Characteristics

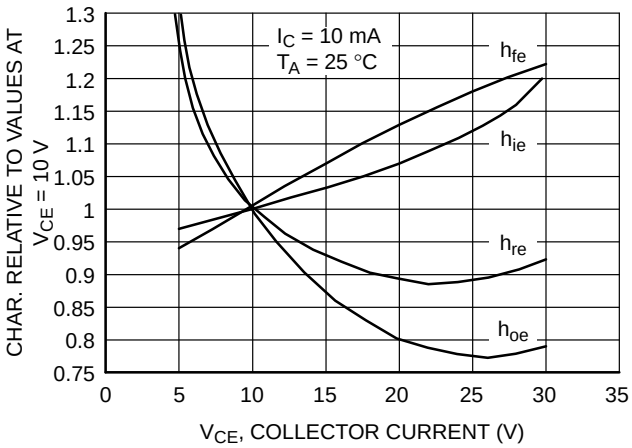


Figure 12. Common Emitter Characteristics

TEST CIRCUITS

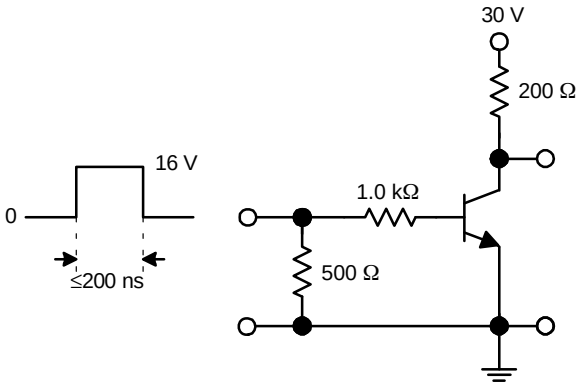


Figure 13. Saturated Turn-On Switching Time

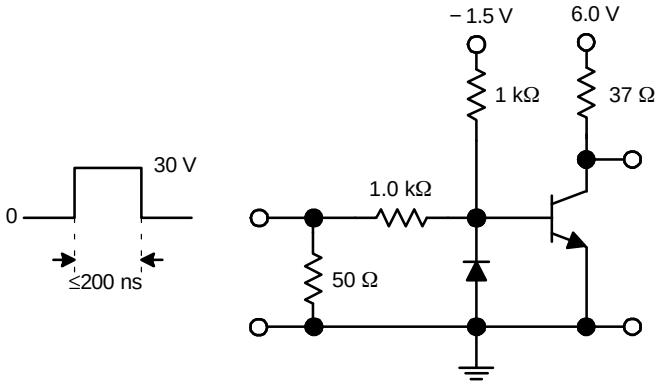
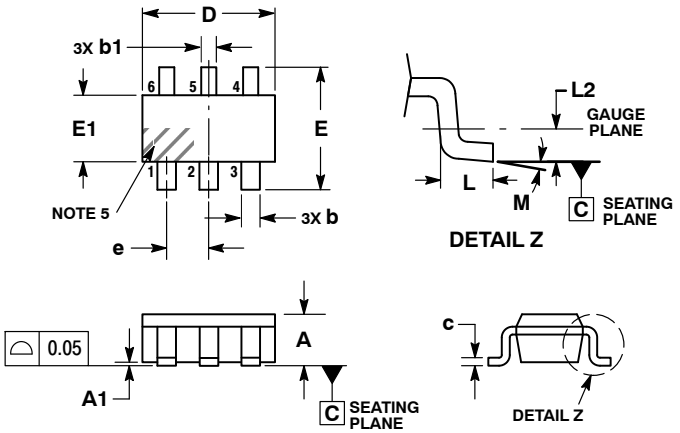


Figure 14. Saturated Turn-Off Switching Time

1
SCALE 2:1

TSOT23 6−Lead
CASE 419AG−01
ISSUE O

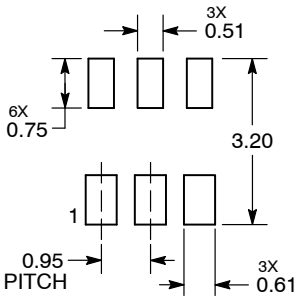
DATE 01 FEB 2010



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSIONS D AND E1 ARE DETERMINED AT DATUM H.
5. PIN ONE INDICATOR MUST BE LOCATED IN THE INDICATED ZONE.

	MILLIMETERS		
DIM	**MIN**	**NOM**	**MAX**
A	0.75	0.82	0.90
A1	−−−	−−−	0.10
b	0.40	0.45	0.50
b1	0.30	0.35	0.40
c	0.08	0.14	0.20
D	2.80	2.90	3.00
E	2.60	2.80	3.00
E1	1.50	1.60	1.70
e		0.95 BSC	
L	0.30	0.45	0.60
L2		0.25 BSC	
M	0°	–	8°

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

GENERIC MARKING DIAGRAMS*

IC

XXX = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
▪ = Pb−Free Package

STANDARD

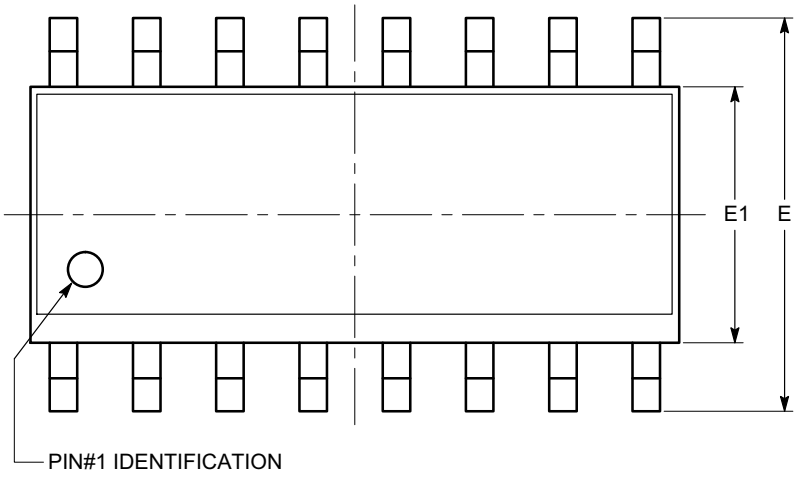
XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present.

DOCUMENT NUMBER:	**98AON47619E**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.
DESCRIPTION:	**TSOT23 6−LEAD**	**PAGE 1 OF 1**

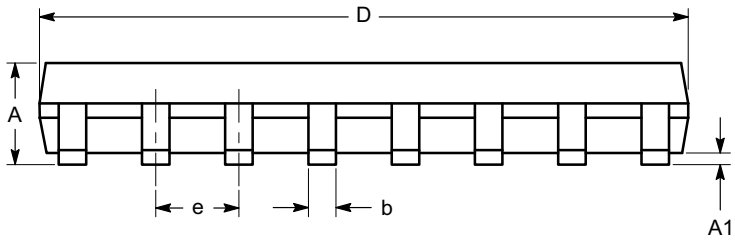
SOIC−16, 150 mils
CASE 751BG
ISSUE O

DATE 19 DEC 2008

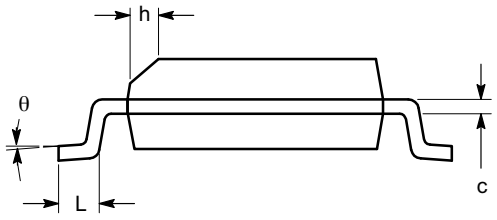


TOP VIEW

SYMBOL	MIN	NOM	MAX
A	1.35		1.75
A1	0.10		0.25
b	0.33		0.51
c	0.19		0.25
D	9.80	9.90	10.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27 BSC		
h	0.25		0.50
L	0.40		1.27
θ	0º		8º



SIDE VIEW



END VIEW

Notes:
(1) All dimensions are in millimeters. Angles in degrees.
(2) Complies with JEDEC MS-012.

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DESCRIPTION:	**SOIC−16, 150 mils**		**PAGE 1 OF 1**

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