

PNP Multi-Chip General-Purpose Amplifier

FMB3906, MMPQ3906

Description

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

ABSOLUTE MAXIMUM RATINGS (Note 1)

($T_A = 25^\circ\text{C}$, 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	$^\circ\text{C}$

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.

- 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.

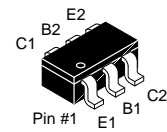
THERMAL CHARACTERISTICS (Note 2)

($T_A = 25^\circ\text{C}$, unless otherwise noted)

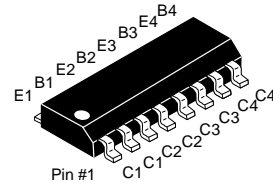
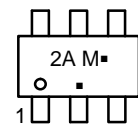
Symbol	Parameter	Max		Unit
		FMB3906	MMPQ3906	
P_D	Total Device Dissipation	700	1,000	mW
	Derate Above 25°C	5.6	8.0	mW/ $^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	180	–	$^\circ\text{C}/\text{W}$
	Thermal Resistance, Junction to Ambient, Effective 4 Die	–	125	$^\circ\text{C}/\text{W}$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

- PCB size: FR-4 $76 \times 114 \times 0.6\text{T mm}^3$ (3.0 inch x 4.5 inch x 0.062 inch) with minimum land pattern size.

MARKING DIAGRAM



TSOT23 6-Lead
CASE 419BL



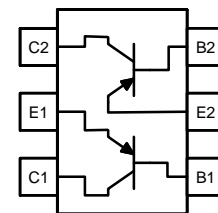
SOIC-16, 150 mils
CASE 751BG



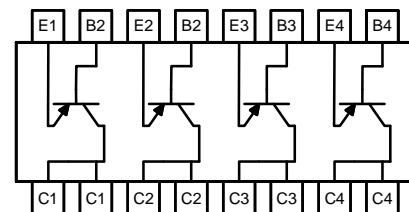
2A, MMPQ3906 = Specific Device Code
M = Date Code
▪ = Pb-Free Package
A = Assembly Site
WL = Wafer Lot Number
Y = Year of Production
WW = Work Week Number

(Note: Microdot may be in either location)

INTERNAL CONNECTIONS



FMB3906



MMPQ3906

ORDERING INFORMATION

Device	Package	Shipping†
FMB3906	TSOT23 (Pb-Free, Halide Free)	3000 / Tape & Reel
MMPQ3906	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.

FMB3906, MMPQ3906

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
--------	-----------	------------	-----	-----	-----	------

OFF CHARACTERISTICS

V _{(BR)CEO}	Collector-Emitter Breakdown Voltage (Note 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 (Note 3)	FMB3906	I _C = -0.1 mA, V _{CE} = -1.0 V	60	-	-	
		MMPQ3906		40	-	-	
		FMB3906	I _C = -1.0 mA, V _{CE} = -1.0 V	80	-	-	
		MMPQ3906		60	-	-	
		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

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

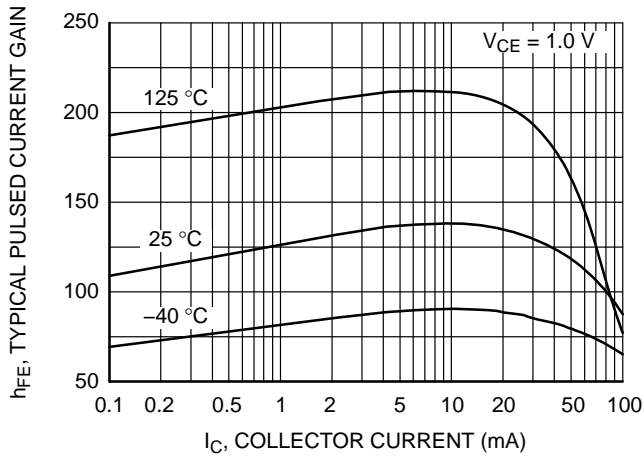


Figure 1. Typical Pulsed Current Gain vs. Collector Current

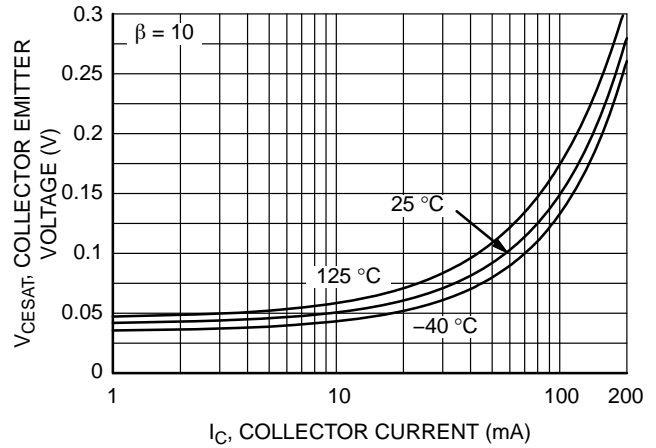


Figure 2. Collector-Emitter Saturation Voltage vs. Collector Current

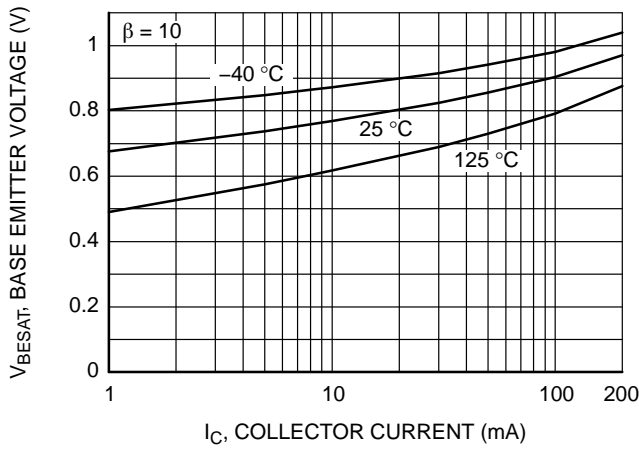


Figure 3. Base-Emitter Saturation Voltage vs. Collector Current

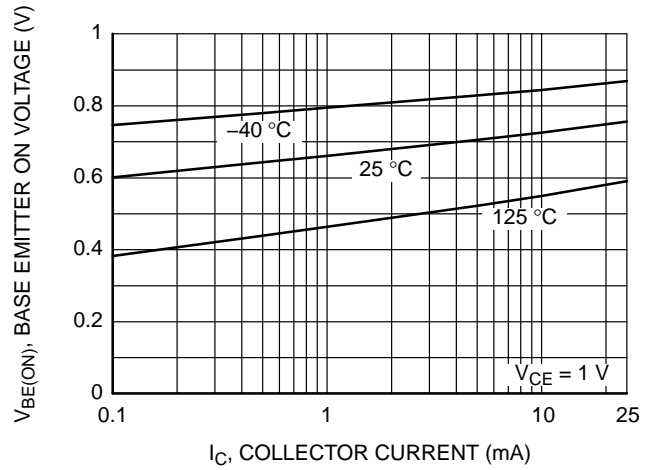


Figure 4. Base-Emitter On Voltage vs. Collector Current

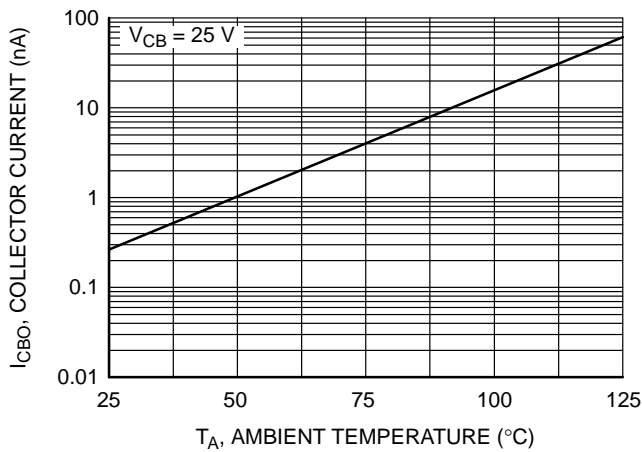


Figure 5. Collector Cut-Off Current vs. Ambient Temperature

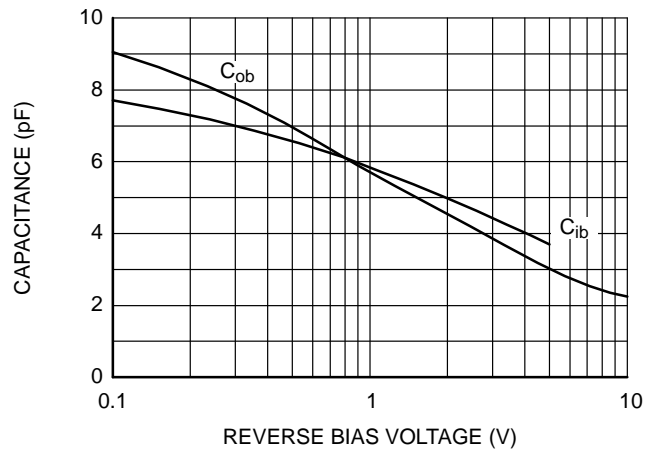


Figure 6. Common-Base Open Circuit Input and Output Capacitance vs. Reverse Bias Voltage

TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)

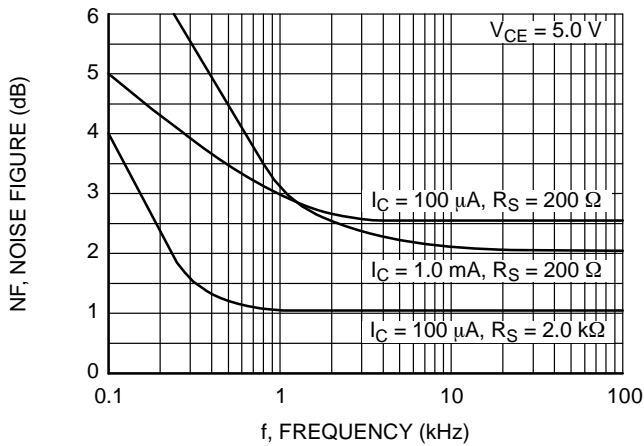


Figure 7. Noise Figure vs. Frequency

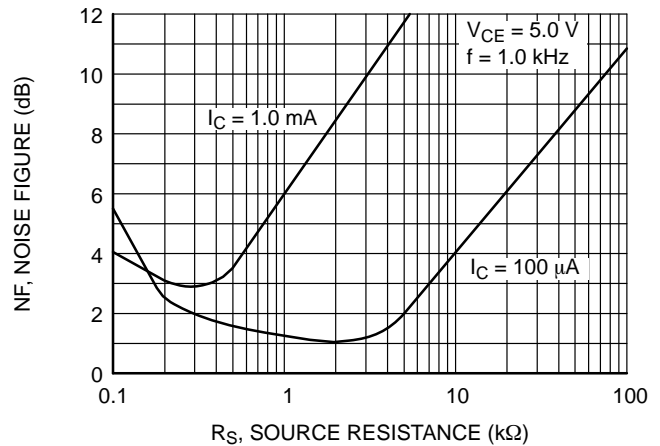


Figure 8. Noise Figure vs. Source Resistance

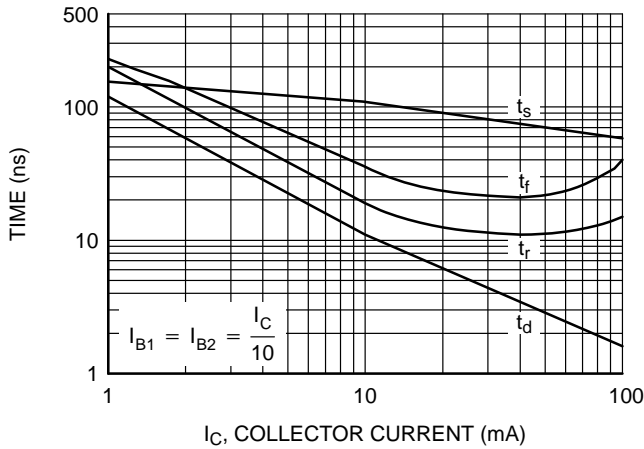


Figure 9. Switching Times vs. Collector Current

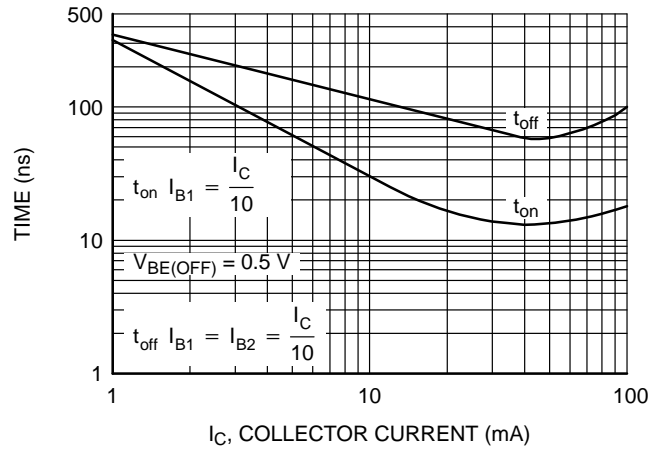


Figure 10. Turn-On and Turn-Off Times vs. Collector Current

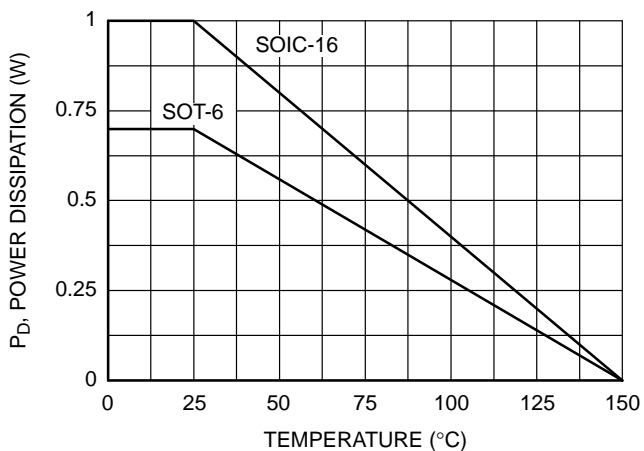


Figure 11. Power Dissipation vs. Ambient Temperature

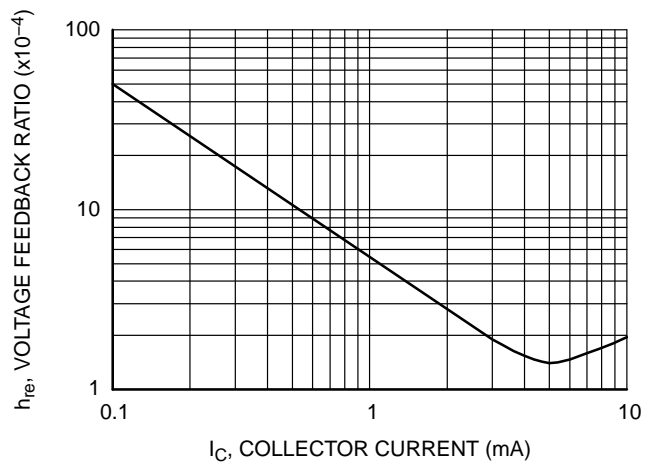


Figure 12. Voltage Feedback Ratio

TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)

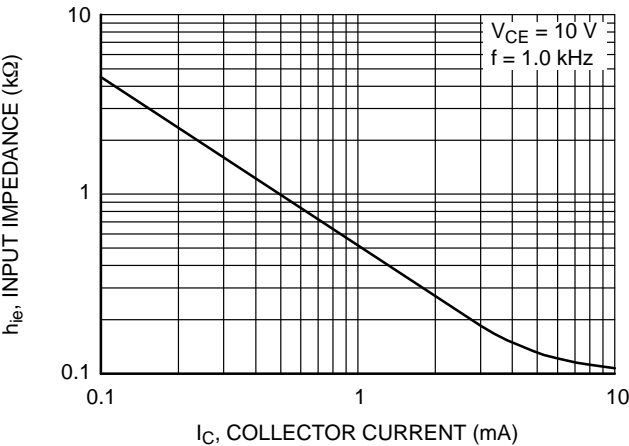


Figure 13. Input Impedance

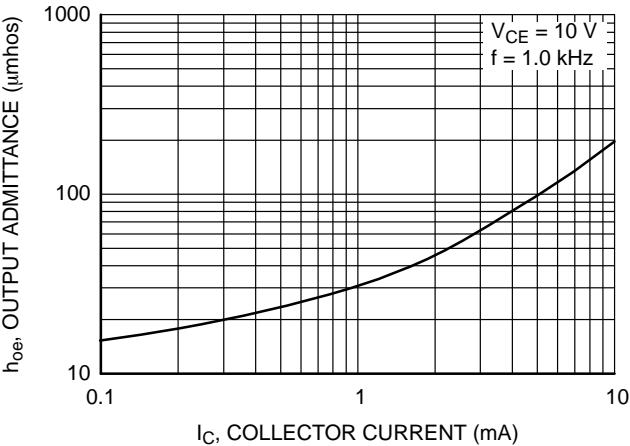


Figure 14. Output Admittance

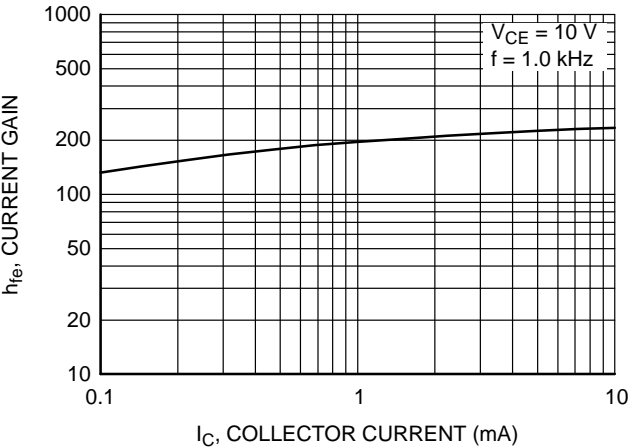


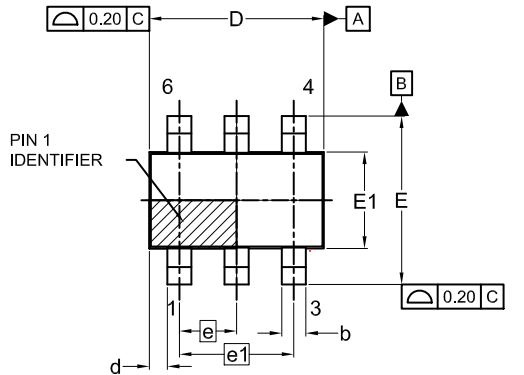
Figure 15. Current Gain



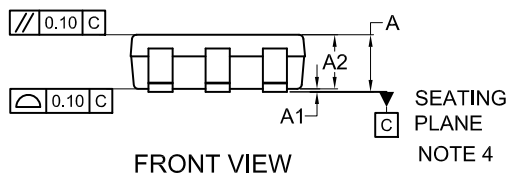
SCALE 2:1

TSOT23 6-Lead
CASE 419BL
ISSUE A

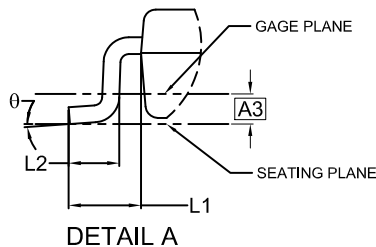
DATE 31 AUG 2020



TOP VIEW



FRONT VIEW

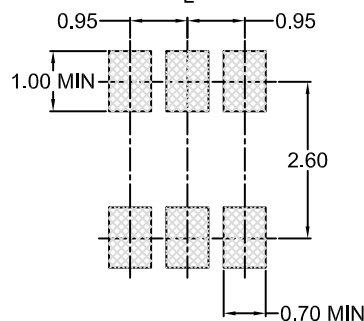


DETAIL A



SIDE VIEW

SYMM



LAND PATTERN
RECOMMENDATION

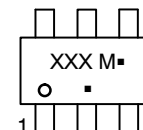
*FOR ADDITIONAL INFORMATION ON OUR
Pb-FREE STRATEGY AND SOLDERING DETAILS,
PLEASE DOWNLOAD THE ON SEMICONDUCTOR
SOLDERING AND MOUNTING TECHNIQUES
REFERENCE MANUAL, SOLDERM/D.

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.25MM PER END. DIMENSIONS D AND E1 ARE DETERMINED AT DATUM H.
4. SEATING PLANE IS DEFINED BY THE TERMINALS. "A1" IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0.00	0.05	0.10
A2	0.70	0.85	1.00
A3	0.25 BSC		
b	0.25	0.38	0.50
c	0.10	0.18	0.26
D	2.80	2.95	3.10
d	0.30 REF		
E	2.50	2.75	3.00
E1	1.30	1.50	1.70
e	0.95 BSC		
e1	1.90 BSC		
L1	0.60 REF		
L2	0.20	0.40	0.60
Θ	0°	—	10°

**GENERIC
MARKING DIAGRAM***



XXX = Specific Device Code

M = Date Code

▪ = Pb-Free Package

(Note: Microdot may be in either location)

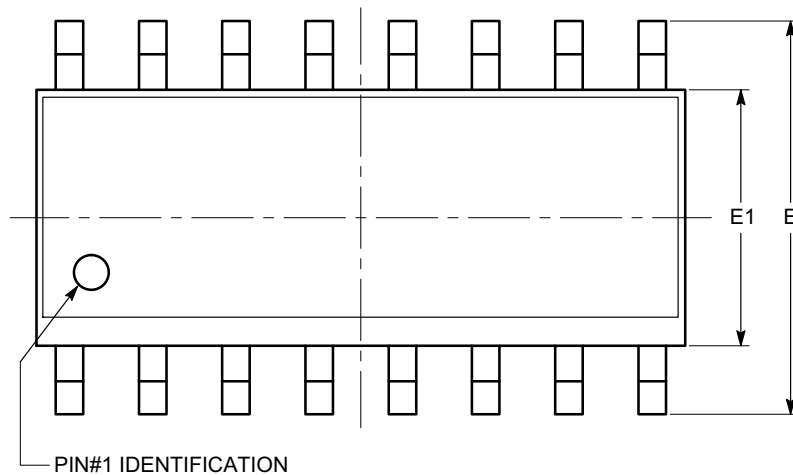
*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

DOCUMENT NUMBER:	98AON83292G	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

onsemi and Onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

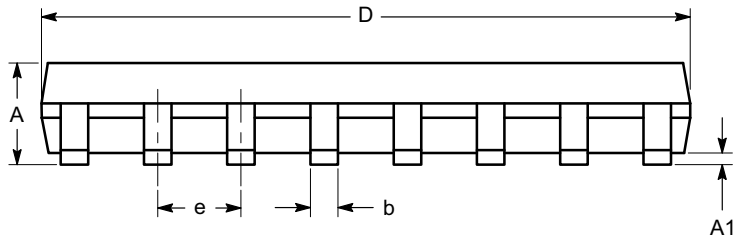
SOIC-16, 150 mils
CASE 751BG
ISSUE O

DATE 19 DEC 2008

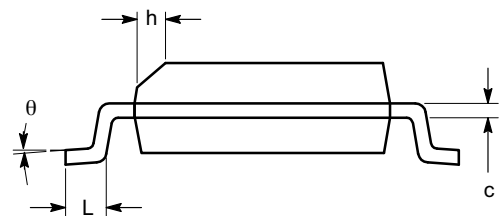


SYMBOL	MIN	NOM	MAX
A	1.35		1.75
A1	0.10		0.25
b	0.33		0.51
c	0.19		0.25
D	9.80	9.90	10.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27 BSC		
h	0.25		0.50
L	0.40		1.27
θ	0°		8°

TOP VIEW



SIDE VIEW



END VIEW

Notes:

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

DOCUMENT NUMBER:	98AON34275E	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SOIC-16, 150 mils	PAGE 1 OF 1

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales