

# **60V PNP SMALL SIGNAL TRANSISTOR IN SOT323**

#### **Features**

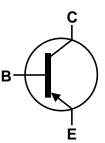
- BV<sub>CEO</sub> > -60V
- I<sub>C</sub> = -600mA Collector Current
- Epitaxial Planar Die Construction
- Ultra-Small Surface Mount Package
- Complementary NPN Type: MMST2222A
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability
- PPAP Capable (Note 4)

## **Mechanical Data**

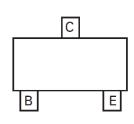
- Case: SOT323
- Case Material: Molded Plastic, "Green" Molding Compound.
   UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish Matte Tin Plated Leads.
   Solderable per MIL-STD-202, Method 208 (2)
- Weight: 0.006 grams (Approximate)







Device Symbol



Pin-Out Top View

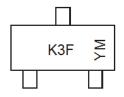
## Ordering Information (Notes 4 & 5)

Product	Status	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
MMST2907A-7-F	Active	AEC-Q101	K3F	7	8	3,000
MMST2907AQ-7	Active	Automotive	K3F	7	8	3,000

Notes:

- 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
- 2. See http://www.diodes.com/quality/lead\_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
- 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
- 4. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to http://www.diodes.com/quality/product\_compliance\_definitions/.
- 5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

# **Marking Information**



K3F = Product Type Marking Code YM = Date Code Marking Y or  $\overline{Y}$  = Year (ex: A = 2013) M or  $\overline{M}$  = Month (ex: 9 = September)

Date Code Key

Year	201	0	2011	2012	2013	2014	2015	201	6 20	17	2018	2019	2020
Code	Х		Υ	Z	Α	В	С	D	[	=	F	G	Н
Month	า	Ja	n Fel	o Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	!	1	2	3	4	5	6	7	8	9	0	N	D



## Absolute Maximum Ratings (@TA = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	-60	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-60	V
Emitter-Base Voltage	V <sub>EBO</sub>	-5	V
Collector Current	I <sub>C</sub>	-600	mA

## Thermal Characteristics (@TA = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	$P_{D}$	200	mW
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	625	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

## ESD Ratings (Note 7)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	С

Notes:

- 6. For a device mounted with the collector lead on minimum recommended pad layout 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
- 7. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

# **Thermal Characteristics and Derating Information**

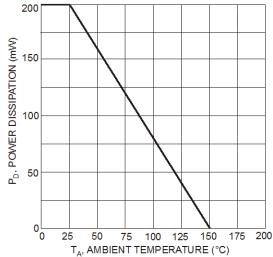


Fig. 1 Max Power Dissipation vs. Ambient Temperature



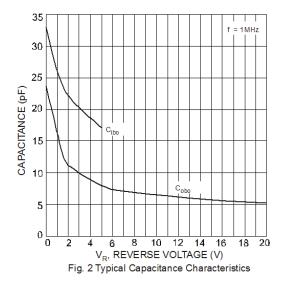
# **Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

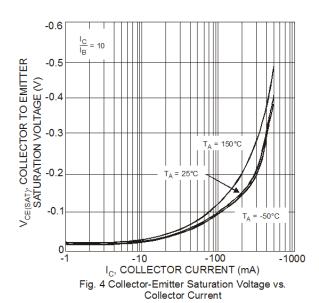
Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)					
Collector-Base Breakdown Voltage	$BV_{CBO}$	-60	_	V	$I_C = -10\mu A, I_E = 0$
Collector-Emitter Breakdown Voltage	$BV_{CEO}$	-60	_	V	$I_C = -10 \text{mA}, I_B = 0$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	-5	_	V	$I_E = -10\mu A, I_C = 0$
Collector Base Cutoff Current	I <sub>CBO</sub>		-10	nΑ μΑ	$V_{CB} = -50V, I_E = 0$ $V_{CB} = -50V, I_E = 0, T_A = +125$ °C
Collector Cutoff Current	I <sub>CEX</sub>		-50	nA	$V_{CE} = -30V, V_{EB(OFF)} = -0.5V$
Base Cutoff Current	I <sub>BL</sub>	_	-50	nA	$V_{CE} = -30V, V_{EB(OFF)} = -0.5V$
ON CHARACTERISTICS (Note 8)					
DC Current Gain	h <sub>FE</sub>	75 100 100 100 50	  300 	_	$I_C = -100\mu A, V_{CE} = -10V$ $I_C = -1mA, V_{CE} = -10V$ $I_C = -10mA, V_{CE} = -10V$ $I_C = -150mA, V_{CE} = -10V$ $I_C = -500mA, V_{CE} = -10V$
Collector-Emitter Saturation Voltage	V <sub>CE(SAT)</sub>	_	-0.4 -1.6	V	$I_C = -150 \text{mA}, I_B = -15 \text{mA}$ $I_C = -500 \text{mA}, I_B = -50 \text{mA}$
Base-Emitter Saturation Voltage	V <sub>BE(SAT)</sub>		1.3 2.6	V	$I_C = -150 \text{mA}, I_B = -15 \text{mA}$ $I_C = -500 \text{mA}, I_B = -50 \text{mA}$
SMALL SIGNAL CHARACTERISTICS					
Output Capacitance	C <sub>OBO</sub>	_	8	pF	$V_{CB} = -10V$ , $f = 1.0MHz$ , $I_E = 0$
Input Capacitance	C <sub>IBO</sub>	_	30	pF	$V_{EB} = -2V$ , $f = 1.0MHz$ , $I_C = 0$
Current Gain-Bandwidth Product	f⊤	200	_	MHz	$V_{CE} = -20V, I_{C} = -50mA,$ f = 100MHz
SWITCHING CHARACTERISTICS					
Turn-On Time	t <sub>ON</sub>	_	45	ns	Vcc = -30V, Ic = -150mA,
Delay Time	$t_D$	_	10	ns	I <sub>B1</sub> = -15mA
Rise Time	t <sub>R</sub>	_	40	ns	IBI - TOTILA
Turn-Off Time	t <sub>OFF</sub>	_	100	ns	$V_{CC} = -6V$ , $I_{C} = -150$ mA,
Storage Time	t <sub>S</sub>	_	80	ns	$ V_{CC}  = -6V$ , $ C  = -150 \text{ MA}$ , $ B_1  =  B_2  = -15 \text{ mA}$
Fall Time	t <sub>F</sub>		30	ns	וווע – וווע – - ואווע

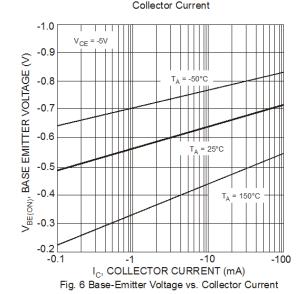
Note: 8. Measured under pulsed conditions. Pulse width  $\leq$  300 $\mu$ s. Duty cycle  $\leq$  2%.

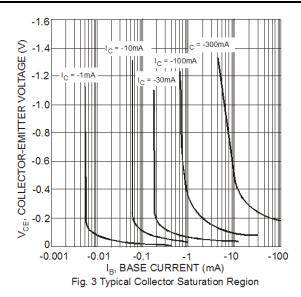


# Typical Electrical Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)









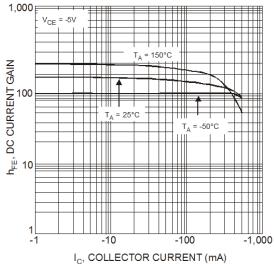


Fig. 5 DC Current Gain vs. Collector Current

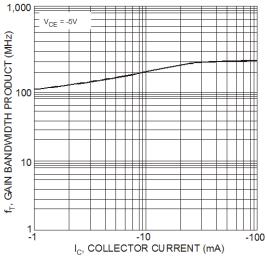


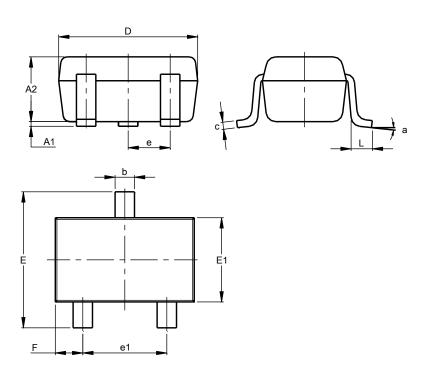
Fig. 7 Gain Bandwidth Product vs. Collector Current



# **Package Outline Dimensions**

Please see http://www.diodes.com/package-outlines.html for the latest version.

#### **SOT323**

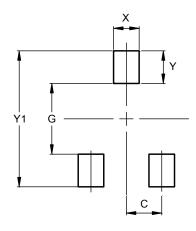


SOT323							
Dim	Min	Max	Тур				
A1	0.00	0.10	0.05				
A2	0.90	1.00	0.95				
b	0.25	0.40	0.30				
С	0.10	0.18	0.11				
D	1.80	2.20	2.15				
Е	2.00	2.20	2.10				
E1	1.15	1.35	1.30				
е	0.650 BSC						
e1	1.20	1.40	1.30				
F	0.375	0.475	0.425				
L	0.25	0.40	0.30				
а	0°	8°	ı				
All Dimensions in mm							

# **Suggested Pad Layout**

Please see http://www.diodes.com/package-outlines.html for the latest version.

#### **SOT323**



Dimensions	Value (in mm)
С	0.650
G	1.300
Х	0.470
Y	0.600
Y1	2.500



#### IMPORTANT NOTICE

DIODES INCORPORATED MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. Diodes Incorporated does not assume any liability arising out of the application or use of this document or any product described herein; neither does Diodes Incorporated convey any license under its patent or trademark rights, nor the rights of others. Any Customer or user of this document or products described herein in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on Diodes Incorporated website, harmless against all damages.

Diodes Incorporated does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel. Should Customers purchase or use Diodes Incorporated products for any unintended or unauthorized application, Customers shall indemnify and hold Diodes Incorporated and its representatives harmless against all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application.

Products described herein may be covered by one or more United States, international or foreign patents pending. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks.

This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes Incorporated.

#### LIFE SUPPORT

Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

- A. Life support devices or systems are devices or systems which:
  - 1. are intended to implant into the body, or
  - 2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.
- B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

Copyright © 2016, Diodes Incorporated

www.diodes.com

# **ПОСТАВКА** ЭЛЕКТРОННЫХ КОМПОНЕНТОВ

многоканальный

Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001 Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

# Данный компонент на территории Российской Федерации Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

# http://moschip.ru/get-element

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

#### Офис по работе с юридическими лицами:

105318, г. Москва, ул. Щербаковская д. 3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru moschip.ru\_6 moschip.ru 4 moschip.ru 9