

Dual Common Base-Collector Bias Resistor Transistors

NPN and PNP Silicon Surface Mount Transistors with Monolithic Bias Resistor Network

**EMC2DXV5T1G,
EMC3DXV5T1G,
EMC4DXV5T1G,
EMC5DXV5T1G**

The Bias Resistor Transistor (BRT) contains a single transistor with a monolithic bias network consisting of two resistors; a series base resistor and a base-emitter resistor. These digital transistors are designed to replace a single device and its external resistor bias network. The BRT eliminates these individual components by integrating them into a single device. In the EMC2DXV5T1G series, two complementary BRT devices are housed in the SOT-553 package which is ideal for low power surface mount applications where board space is at a premium.

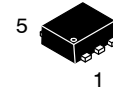
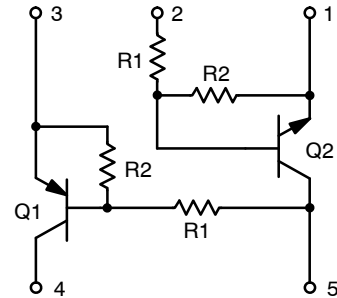
Features

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These are Pb-Free Devices

MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted, common for Q₁ and Q₂, – minus sign for Q₁ (PNP) omitted)

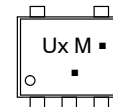
Rating	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	50	Vdc
Collector-Emitter Voltage	V _{CEO}	50	Vdc
Collector Current	I _C	100	mAdc

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.



SOT-553
CASE 463B

MARKING DIAGRAM



Ux = Specific Device Code
x = C, 3, E, or 5

M = Date Code

■ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 2.

EMC2DXV5T1G, EMC3DXV5T1G, EMC4DXV5T1G, EMC5DXV5T1G

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
ONE JUNCTION HEATED			
Total Device Dissipation $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	357 (Note 1) 2.9 (Note 1)	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	350 (Note 1)	$^\circ\text{C/W}$

BOTH JUNCTIONS HEATED

Total Device Dissipation $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	500 (Note 1) 4.0 (Note 1)	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	250 (Note 1)	$^\circ\text{C/W}$
Junction and Storage Temperature	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

1. FR-4 @ Minimum Pad

DEVICE ORDERING INFORMATION, MARKING AND RESISTOR VALUES

Device	Marking	Transistor 1 – PNP		Transistor 2 – NPN		Package	Shipping [†]
		R1 (K)	R2 (K)	R1 (K)	R2 (K)		
EMC2DXV5T1G	UC	22	22	22	22	SOT-553 (Pb-Free)	4000 / Tape & Reel
NSVEMC2DXV5T1G*	UC	22	22	22	22		4000 / Tape & Reel
EMC3DXV5T1G	U3	10	10	10	10		4000 / Tape & Reel
EMC5DXV5T1G	U5	4.7	10	47	47		4000 / Tape & Reel

DISCONTINUED (Note 2)

EMC3DXV5T5G	U3	10	10	10	10	SOT-553 (Pb-Free)	8000 / Tape & Reel
EMC4DXV5T1G	UE	10	47	47	47		4000 / 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.

*NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

2. **DISCONTINUED:** These devices are not recommended for new design. Please contact your **onsemi** representative for information. The most current information on these devices may be available on www.onsemi.com.

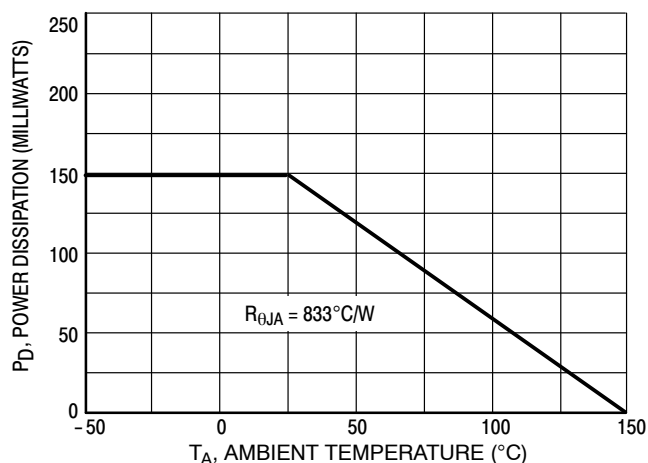


Figure 1. Derating Curve

EMC2DXV5T1G, EMC3DXV5T1G, EMC4DXV5T1G, EMC5DXV5T1G

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

Characteristic	Symbol	Min	Typ	Max	Unit
Q1 TRANSISTOR: PNP OFF CHARACTERISTICS					
Collector-Base Cutoff Current (V _{CB} = 50 V, I _E = 0)	I _{CBO}	–	–	100	nAdc
Collector-Emitter Cutoff Current (V _{CB} = 50 V, I _B = 0)	I _{CEO}	–	–	500	nAdc
Emitter-Base Cutoff Current (V _{EB} = 6.0 V, I _C = 0)	I _{EBO}	–	–	0.2	mAdc
EMC2DXV5T1G		–	–	0.5	
EMC3DXV5T1G		–	–	0.2	
EMC4DXV5T1G		–	–	1.0	
EMC5DXV5T1G		–	–		

ON CHARACTERISTICS

Collector-Base Breakdown Voltage (I _C = 10 μA, I _E = 0)	V _{(BR)CBO}	50	–	–	Vdc
Collector-Emitter Breakdown Voltage (I _C = 2.0 mA, I _B = 0)	V _{(BR)CEO}	50	–	–	Vdc
DC Current Gain (V _{CE} = 10 V, I _C = 5.0 mA)	h _{FE}	60	100	–	
EMC2DXV5T1G		35	60	–	
EMC3DXV5T1G		80	140	–	
EMC4DXV5T1G		20	35	–	
EMC5DXV5T1G					
Collector-Emitter Saturation Voltage (I _C = 10 mA, I _B = 0.3 mA)	V _{CE(SAT)}	–	–	0.25	Vdc
Output Voltage (on) (V _{CC} = 5.0 V, V _B = 2.5 V, R _L = 1.0 kΩ)	V _{OL}	–	–	0.2	Vdc
Output Voltage (off) (V _{CC} = 5.0 V, V _B = 0.5 V, R _L = 1.0 kΩ)	V _{OH}	4.9	–	–	Vdc
Input Resistor	R1	15.4	22	28.6	kΩ
EMC2DXV5T1G		7.0	10	13	
EMC3DXV5T1G, EMC4DXV5T1G		3.3	4.7	6.1	
EMC5DXV5T1G					
Resistor Ratio	R1/R2	0.8	1.0	1.2	
EMC2DXV5T1G		0.8	1.0	1.2	
EMC3DXV5T1G		0.17	0.21	0.25	
EMC4DXV5T1G		0.38	0.47	0.56	
EMC5DXV5T1G					

Q2 TRANSISTOR: NPN OFF CHARACTERISTICS

Collector-Base Cutoff Current (V _{CB} = 50 V, I _E = 0)	I _{CBO}	–	–	100	nAdc
Collector-Emitter Cutoff Current (V _{CB} = 50 V, I _B = 0)	I _{CEO}	–	–	500	nAdc
Emitter-Base Cutoff Current (V _{EB} = 6.0 V, I _C = 0)	I _{EBO}	–	–	0.2	mAdc
EMC2DXV5T1G		–	–	0.5	
EMC3DXV5T1G		–	–	0.1	
EMC4DXV5T1G, EMC5DXV5T1G		–	–		

ON CHARACTERISTICS

Collector-Base Breakdown Voltage (I _C = 10 μA, I _E = 0)	V _{(BR)CBO}	50	–	–	Vdc
Collector-Emitter Breakdown Voltage (I _C = 2.0 mA, I _B = 0)	V _{(BR)CEO}	50	–	–	Vdc
DC Current Gain (V _{CE} = 10 V, I _C = 5.0 mA)	h _{FE}	60	100	–	
EMC2DXV5T1G		35	60	–	
EMC3DXV5T1G		80	140	–	
EMC4DXV5T1G, EMC5DXV5T1G					
Collector-Emitter Saturation Voltage (I _C = 10 mA, I _B = 0.3 mA)	V _{CE(SAT)}	–	–	0.25	Vdc
Output Voltage (on) (V _{CC} = 5.0 V, V _B = 2.5 V, R _L = 1.0 kΩ)	V _{OL}	–	–	0.2	Vdc
Output Voltage (off) (V _{CC} = 5.0 V, V _B = 0.5 V, R _L = 1.0 kΩ)	V _{OH}	4.9	–	–	Vdc
Input Resistor	R1	15.4	22	28.6	kΩ
EMC2DXV5T1G		7.0	10	13	
EMC3DXV5T1G		33	47	61	
EMC4DXV5T1G, EMC5DXV5T1G					
Resistor Ratio	R1/R2	0.8	1.0	1.2	
EMC2DXV5T1G		0.8	1.0	1.2	
EMC3DXV5T1G		0.8	1.0	1.2	
EMC4DXV5T1G, EMC5DXV5T1G		0.8	1.0	1.2	

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.

EMC2DXV5T1G, EMC3DXV5T1G, EMC4DXV5T1G, EMC5DXV5T1G

TYPICAL ELECTRICAL CHARACTERISTICS – EMC2DXV5T1 PNP TRANSISTOR

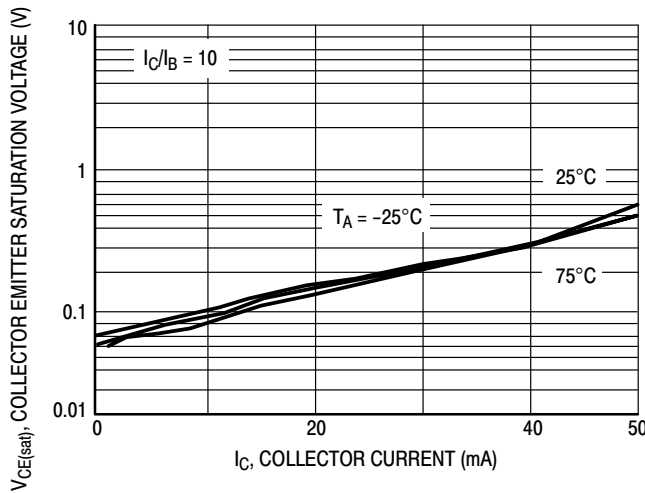


Figure 2. $V_{CE(sat)}$ versus I_C

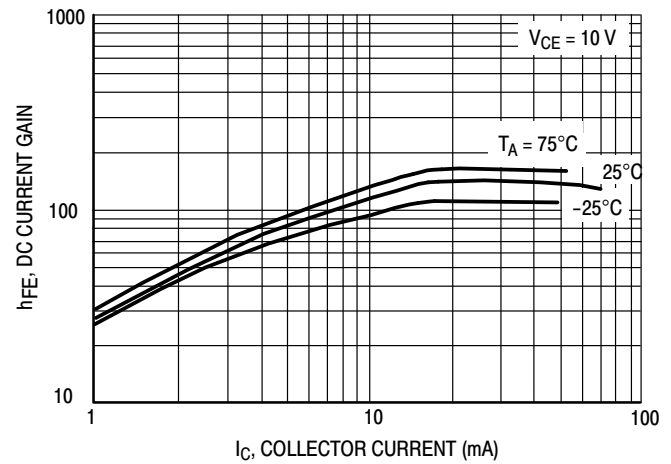


Figure 3. DC Current Gain

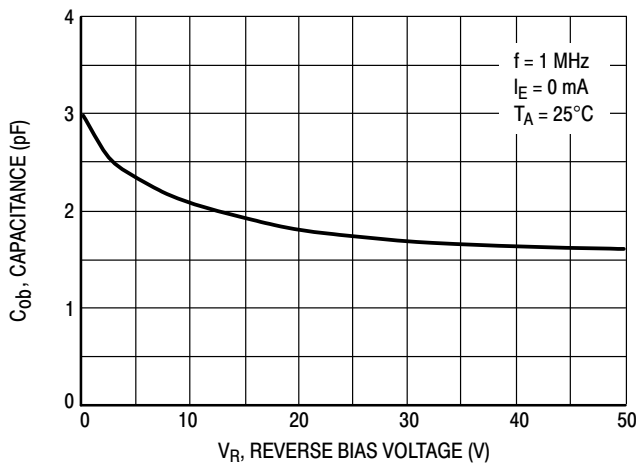


Figure 4. Output Capacitance

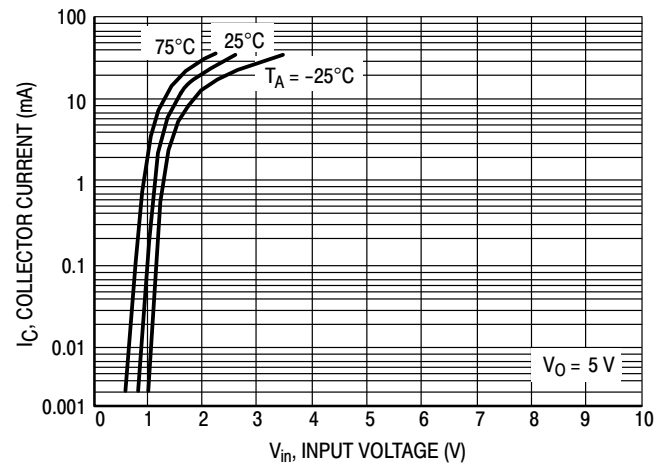


Figure 5. Output Current versus Input Voltage

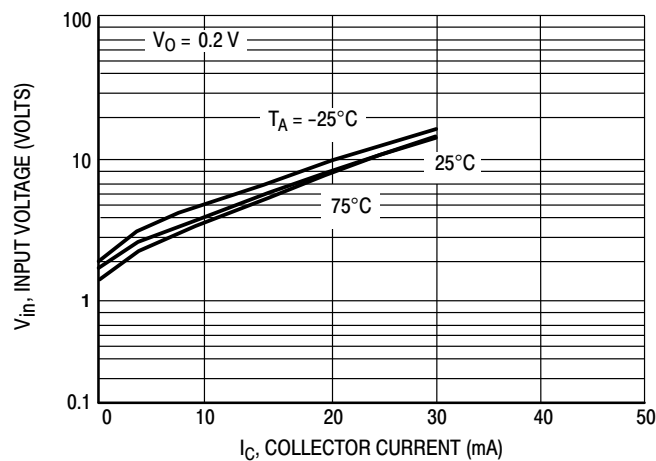


Figure 6. Input Voltage versus Output Current

EMC2DXV5T1G, EMC3DXV5T1G, EMC4DXV5T1G, EMC5DXV5T1G

TYPICAL ELECTRICAL CHARACTERISTICS – EMC2DXV5T1 NPN TRANSISTOR

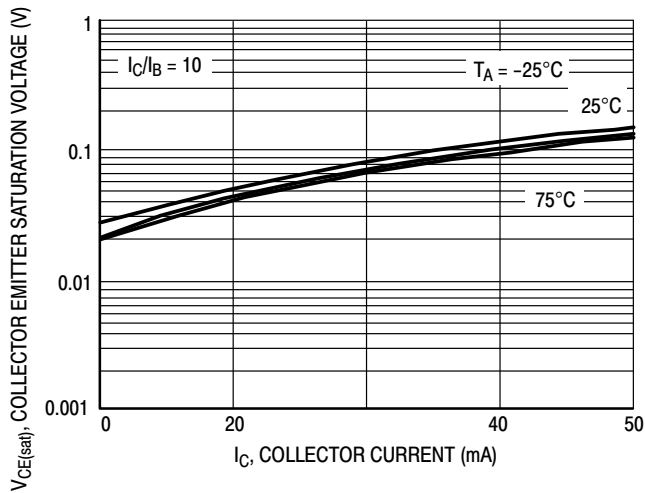


Figure 7. $V_{CE(sat)}$ versus I_C

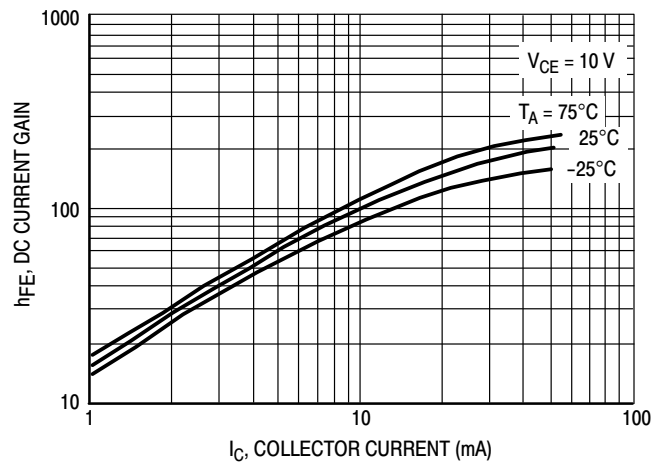


Figure 8. DC Current Gain

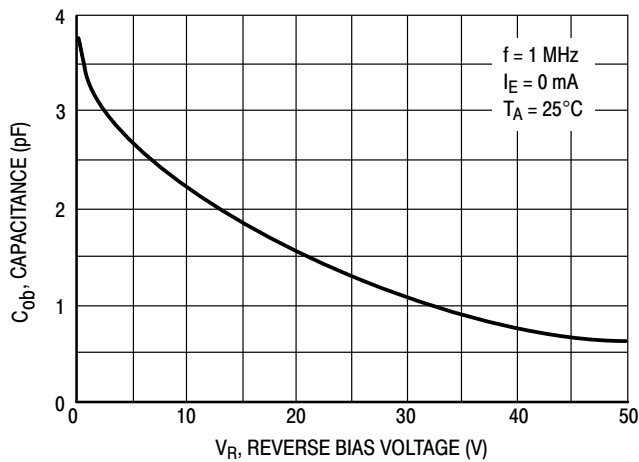


Figure 9. Output Capacitance

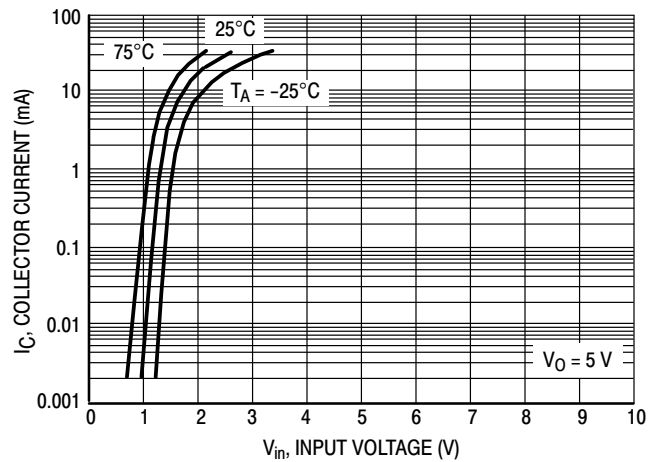


Figure 10. Output Current versus Input Voltage

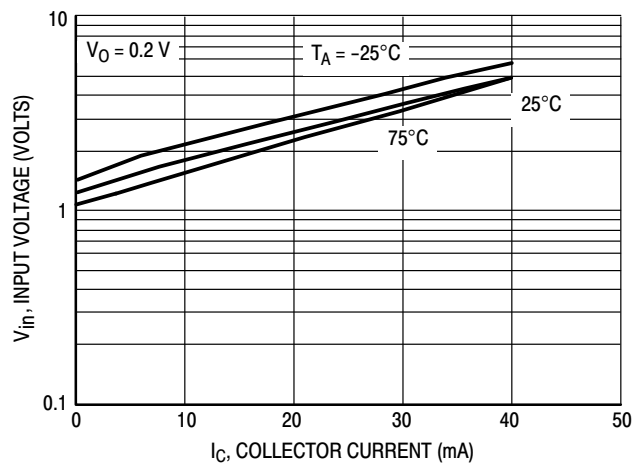


Figure 11. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS – EMC3DXV5T1 PNP TRANSISTOR

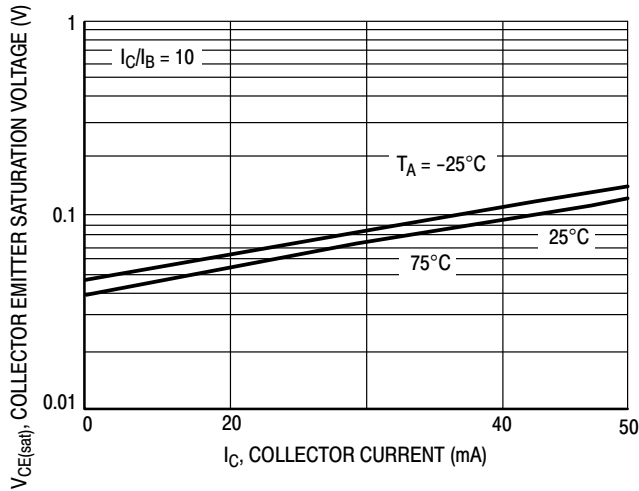


Figure 12. $V_{CE(sat)}$ versus I_C

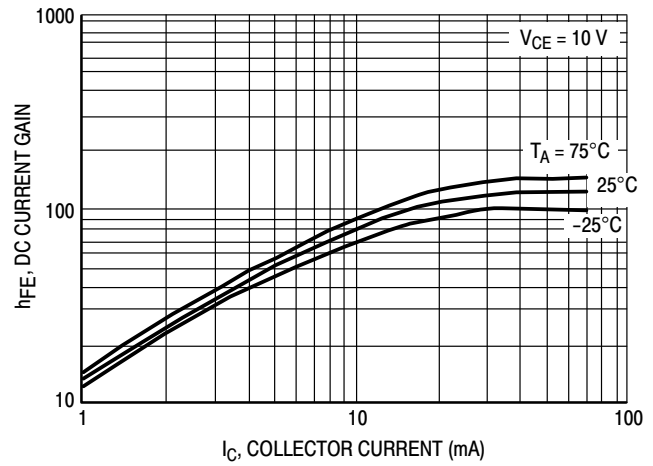


Figure 13. DC Current Gain

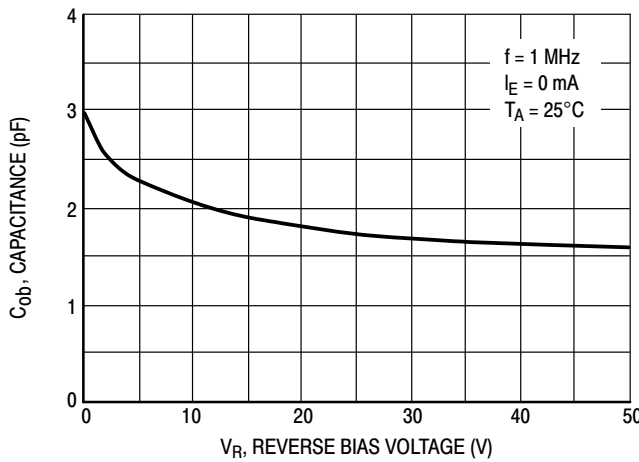


Figure 14. Output Capacitance

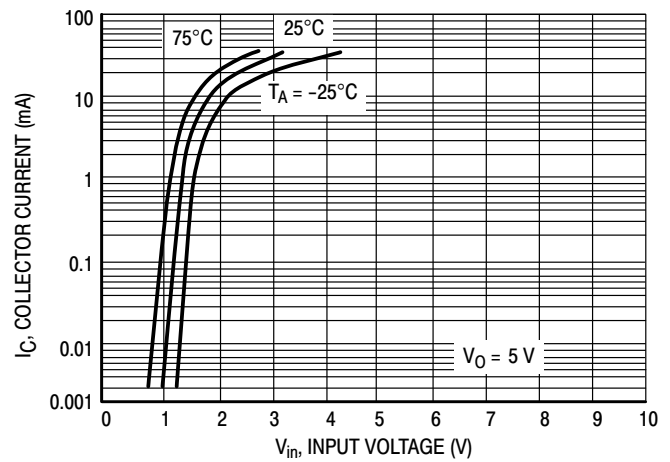


Figure 15. Output Current versus Input Voltage

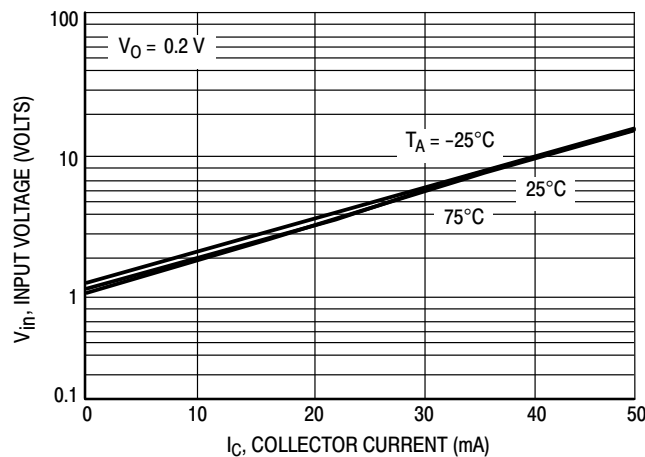


Figure 16. Input Voltage versus Output Current

EMC2DXV5T1G, EMC3DXV5T1G, EMC4DXV5T1G, EMC5DXV5T1G

TYPICAL ELECTRICAL CHARACTERISTICS – EMC3DXV5T1 NPN TRANSISTOR

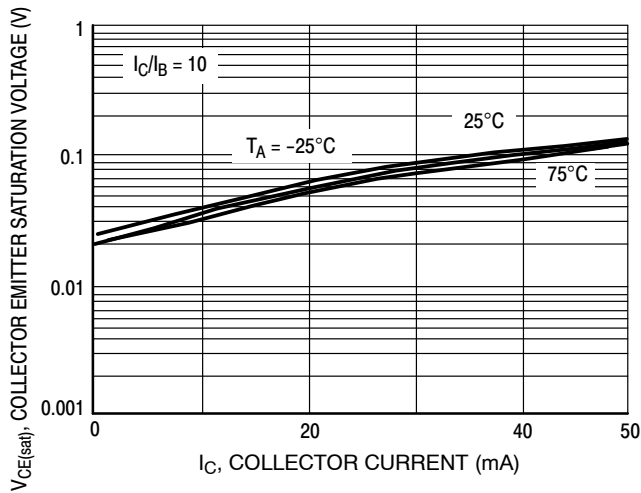


Figure 17. $V_{CE(sat)}$ versus I_C

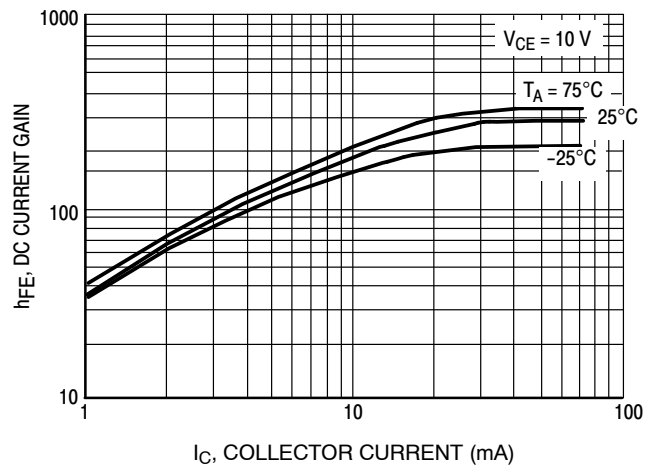


Figure 18. DC Current Gain

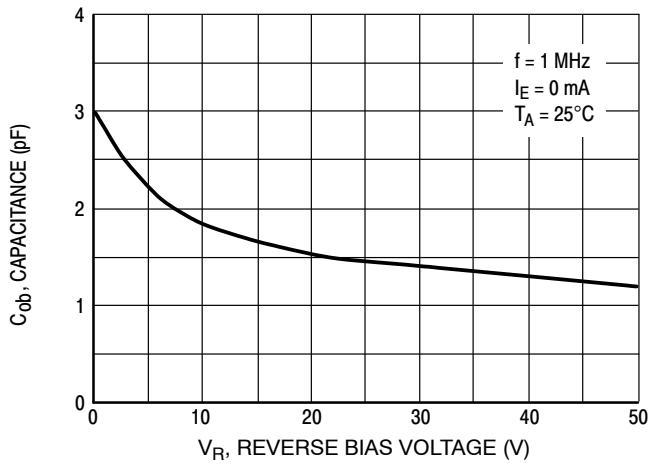


Figure 19. Output Capacitance

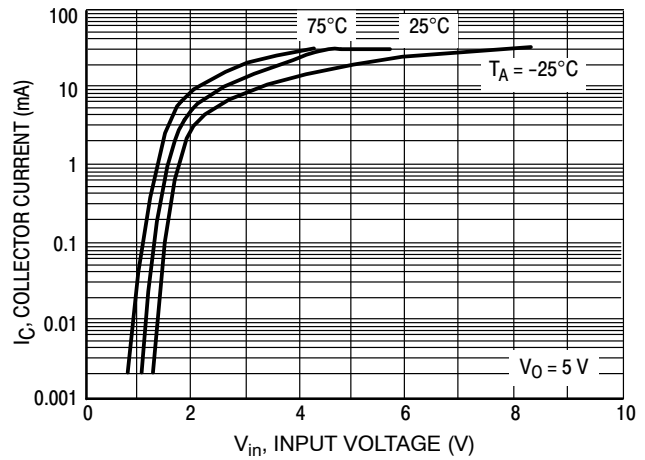


Figure 20. Output Current versus Input Voltage

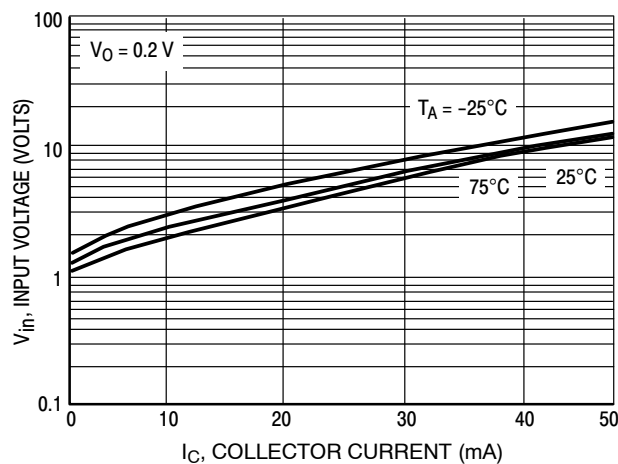


Figure 21. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS – EMC4DXV5T1 PNP TRANSISTOR

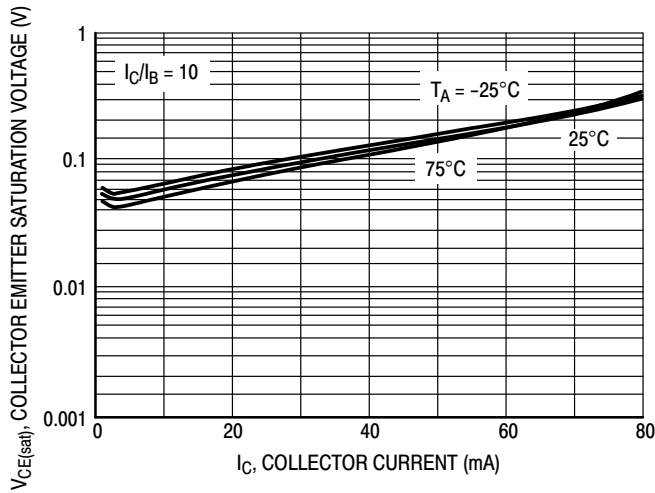


Figure 22. $V_{CE(sat)}$ versus I_C

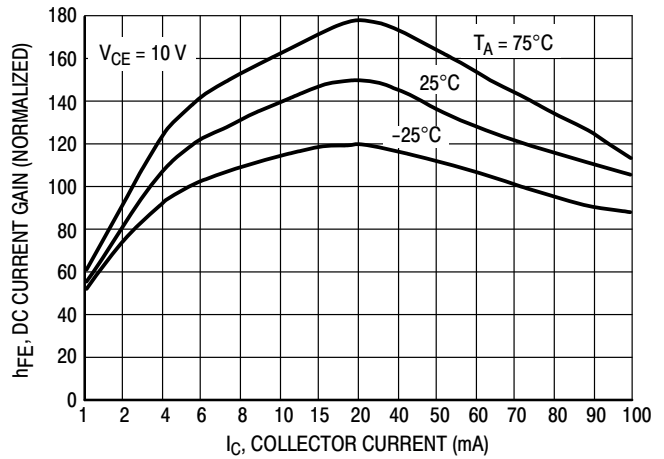


Figure 23. DC Current Gain

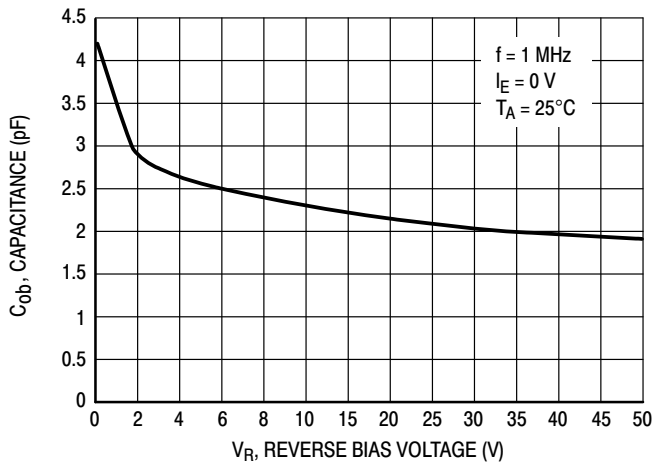


Figure 24. Output Capacitance

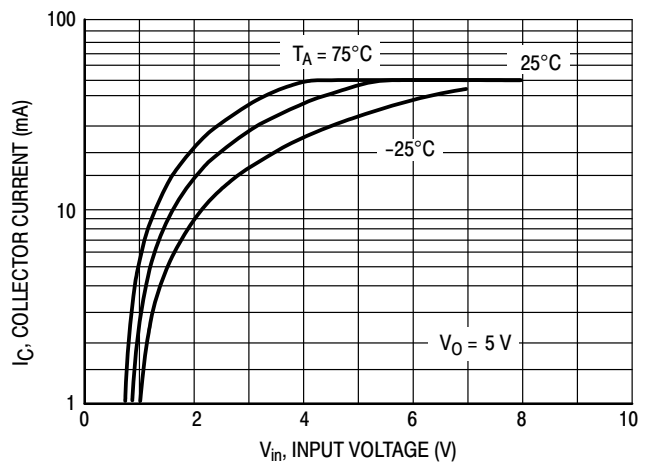


Figure 25. Output Current versus Input Voltage

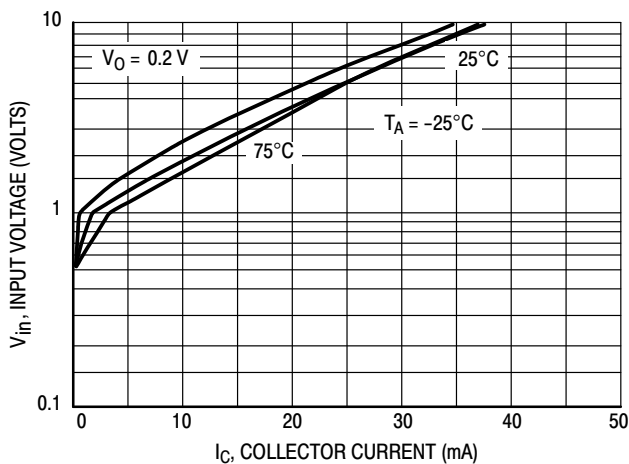


Figure 26. Input Voltage versus Output Current

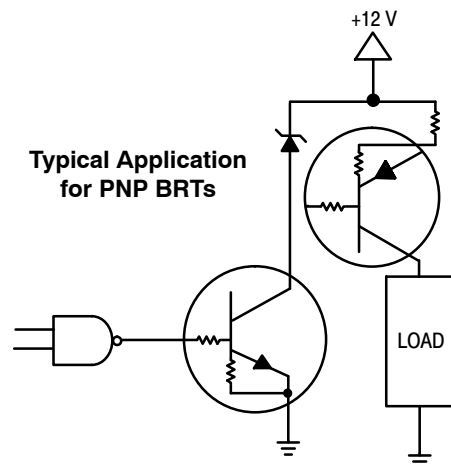


Figure 27. Inexpensive, Unregulated Current Source

EMC2DXV5T1G, EMC3DXV5T1G, EMC4DXV5T1G, EMC5DXV5T1G

TYPICAL ELECTRICAL CHARACTERISTICS – EMC5DXV5T1 PNP TRANSISTOR

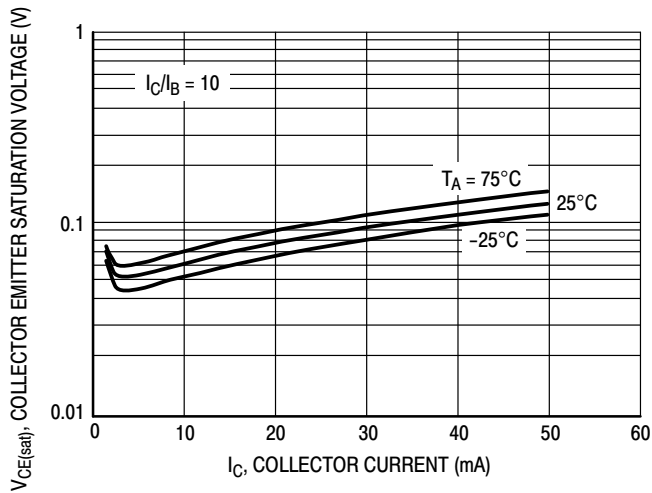


Figure 28. $V_{CE(sat)}$ versus I_C

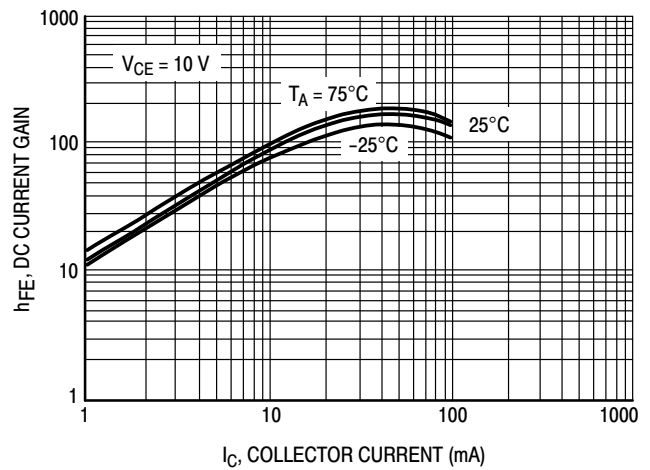


Figure 29. DC Current Gain

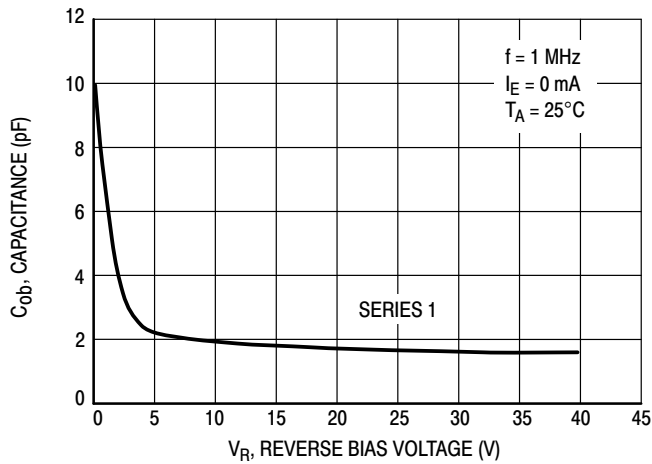


Figure 30. Output Capacitance

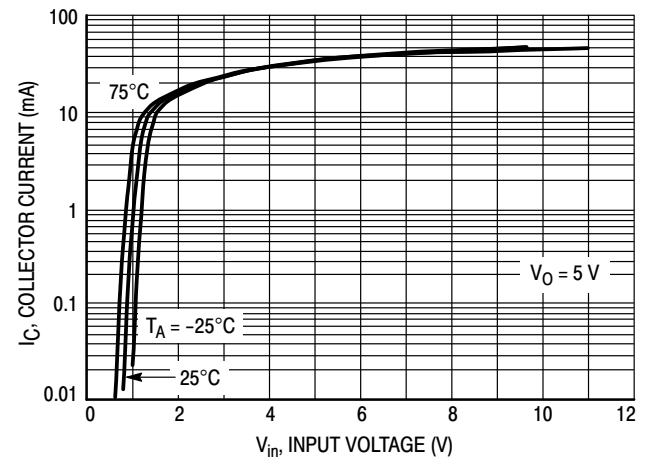


Figure 31. Output Current versus Input Voltage

TYPICAL ELECTRICAL CHARACTERISTICS – EMC4DXV5T1, EMC5DXV5T1 NPN TRANSISTOR

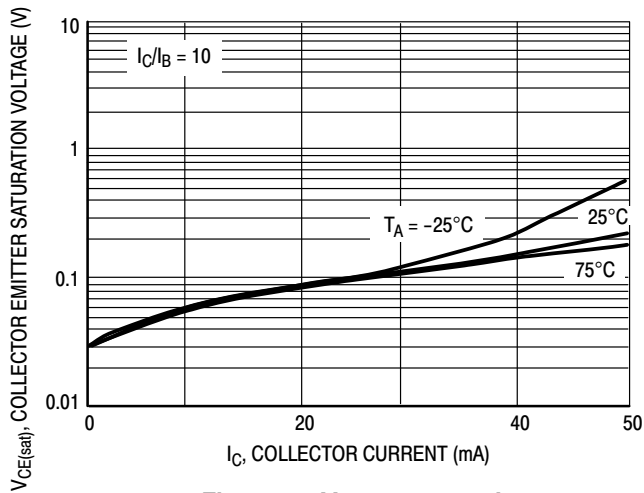


Figure 32. $V_{CE(sat)}$ versus I_C

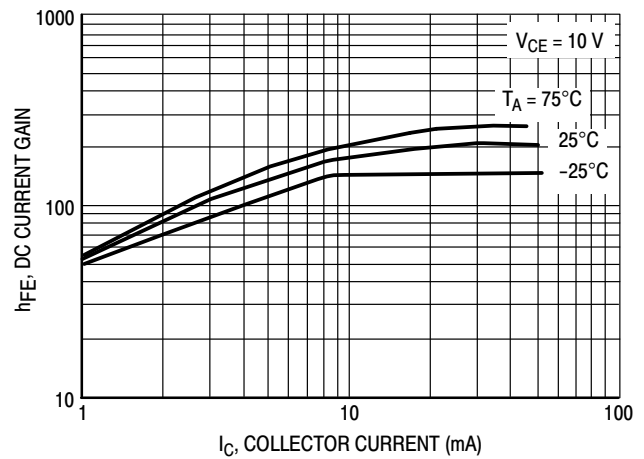


Figure 33. DC Current Gain

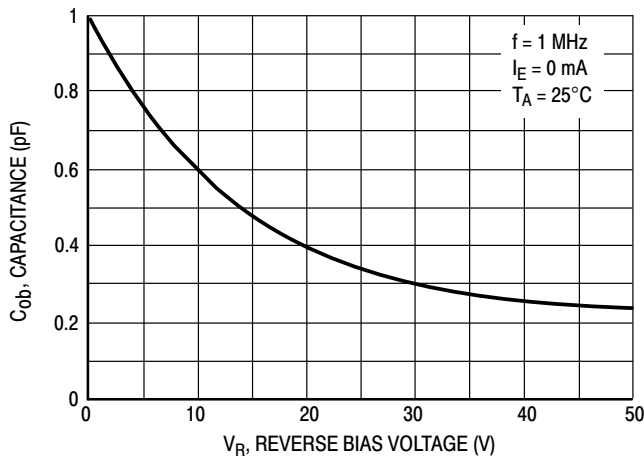


Figure 34. Output Capacitance

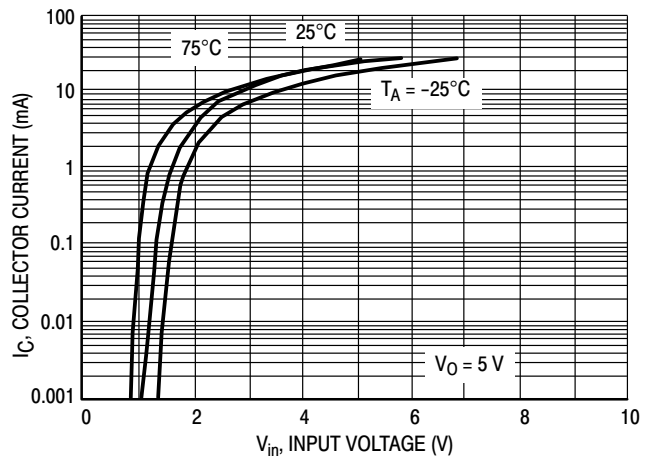


Figure 35. Output Current versus Input Voltage

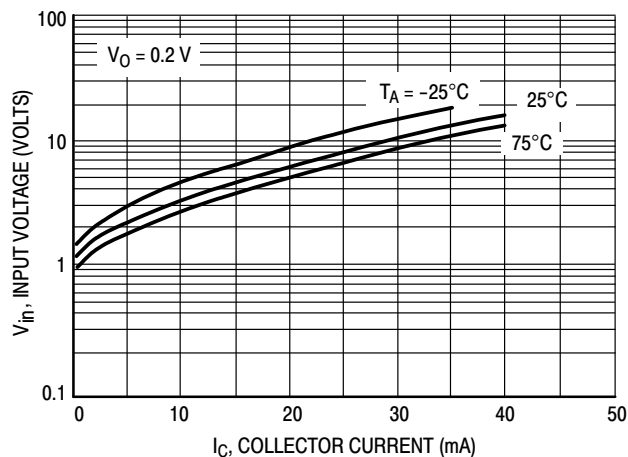
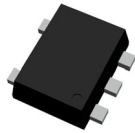
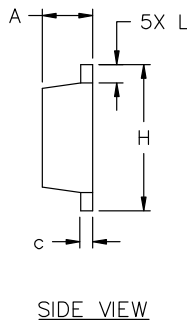
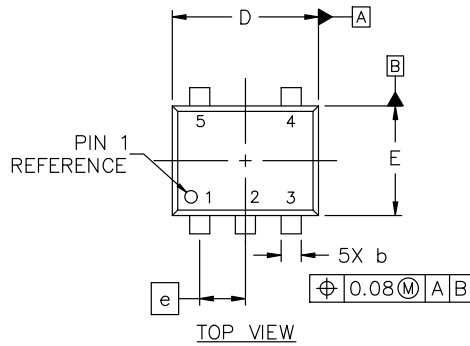


Figure 36. Input Voltage versus Output Current


SOT-553-5 1.60x1.20x0.55, 0.50P
CASE 463B
ISSUE D

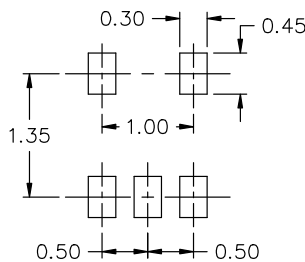
DATE 21 FEB 2024



NOTES:

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5-2018.
2. ALL DIMENSION ARE IN MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.50	0.55	0.60
b	0.17	0.22	0.27
c	0.08	0.13	0.18
D	1.55	1.60	1.65
E	1.15	1.20	1.25
e	0.50 BSC		
H	1.55	1.60	1.65
L	0.10	0.20	0.30



RECOMMENDED MOUNTING FOOTPRINT*

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

GENERIC MARKING DIAGRAM*


XX = 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.

STYLE 1:
PIN 1. BASE
2. EMITTER
3. BASE
4. COLLECTOR
5. COLLECTOR

STYLE 2:
PIN 1. CATHODE
2. COMMON ANODE
3. CATHODE 2
4. CATHODE 3
5. CATHODE 4

STYLE 3:
PIN 1. ANODE 1
2. N/C
3. ANODE 2
4. CATHODE 2
5. CATHODE 1

STYLE 4:
PIN 1. SOURCE 1
2. DRAIN 1/2
3. SOURCE 1
4. GATE 1
5. GATE 2

STYLE 5:
PIN 1. ANODE
2. EMITTER
3. BASE
4. COLLECTOR
5. CATHODE

STYLE 6:
PIN 1. EMITTER 2
2. BASE 2
3. EMITTER 1
4. COLLECTOR 1
5. COLLECTOR 2/BASE 1

STYLE 7:
PIN 1. BASE
2. EMITTER
3. BASE
4. COLLECTOR
5. COLLECTOR

STYLE 8:
PIN 1. CATHODE
2. COLLECTOR
3. N/C
4. BASE
5. EMITTER

STYLE 9:
PIN 1. ANODE
2. CATHODE
3. ANODE
4. ANODE
5. ANODE

DOCUMENT NUMBER:	98AON11127D	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SOT-553-5 1.60x1.20x0.55, 0.50P	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