

Low $V_{CE(sat)}$ NPN Transistors, 60 V, 1 A

NSS60101DMR6

onsemi's e²PowerEdge family of low $V_{CE(sat)}$ transistors are miniature surface mount devices featuring ultra low saturation voltage ($V_{CE(sat)}$) and high current gain capability. These are designed for use in low voltage, high speed switching applications where affordable efficient energy control is important.

Typical applications are DC-DC converters and LED lighting, power management...etc. In the automotive industry they can be used in air bag deployment and in the instrument cluster. The high current gain allows e²PowerEdge devices to be driven directly from PMU's control outputs, and the Linear Gain (Beta) makes them ideal components in analog amplifiers.

Features

- NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

Symbol	Rating	Max	Unit
V_{CEO}	Collector-Emitter Voltage	60	Vdc
V_{CBO}	Collector-Base Voltage	80	Vdc
V_{EBO}	Emitter-Base Voltage	6	Vdc
I_C	Collector Current - Continuous	1	A
I_{CM}	Collector Current - Peak	2	A

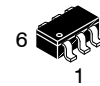
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

Symbol	Characteristic	Max	Unit
$R_{\theta JA}$	Thermal Resistance Junction-to-Ambient (Notes 1 and 2)	234	$^\circ\text{C}/\text{W}$
P_D	Total Power Dissipation per Package @ $T_A = 25^\circ\text{C}$ (Note 2)	0.53	W
$R_{\theta JA}$	Thermal Resistance Junction-to-Ambient (Note 3)	300	$^\circ\text{C}/\text{W}$
P_D	Power Dissipation per Transistor @ $T_A = 25^\circ\text{C}$ (Note 3)	0.40	W
T_J, T_{stg}	Junction and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

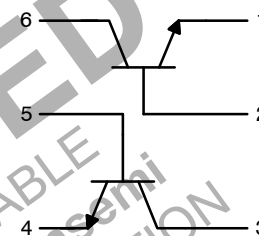
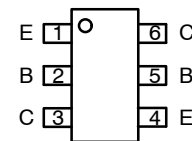
1. Per JESD51-7 with 100 mm² pad area and 2 oz. Cu (Dual Operation).
2. P_D per Transistor when both are turned on is one half of Total P_D or 0.53 Watts.
3. Per JESD51-7 with 100 mm² pad area and 2 oz. Cu (Single-Operation).

60 Volt, 1 Amp
NPN Low $V_{CE(sat)}$ Transistors

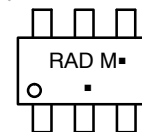


SC-74
CASE 318F

PIN CONNECTIONS



MARKING DIAGRAM



RAD = Specific Device Code
M = Date Code
■ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
NSS60101DMR6T1G	SC-74	3,000/
NSV60101DMR6T1G	(Pb-Free)	Tape & Reel

DISCONTINUED (Note 1)

NSS60101DMR6T2G	SC-74	3,000/
NSV60101DMR6T2G	(Pb-Free)	Tape & Reel

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

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

Table 1. ELECTRICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted)

Symbol	Characteristic	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage ($I_C = 10\text{ mA}$, $I_B = 0$)	60			V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage ($I_C = 0.1\text{ mA}$, $I_E = 0$)	80			V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage ($I_E = 0.1\text{ mA}$, $I_C = 0$)	6			V
I_{CBO}	Collector Cutoff Current ($V_{CB} = 60\text{ V}$, $I_E = 0$)			100	nA
I_{EBO}	Emitter Cutoff Current ($V_{BE} = 5.0\text{ V}$)			100	nA

ON CHARACTERISTICS

h_{FE}	DC Current Gain (Note 4) ($I_C = 100\text{ mA}$, $V_{CE} = 2\text{ V}$) ($I_C = 500\text{ mA}$, $V_{CE} = 2\text{ V}$) ($I_C = 1\text{ A}$, $V_{CE} = 2\text{ V}$) ($I_C = 1\text{ mA}$, $V_{CE} = 5\text{ V}$) ($I_C = 100\text{ mA}$, $V_{CE} = 5\text{ V}$) ($I_C = 500\text{ mA}$, $V_{CE} = 5\text{ V}$) ($I_C = 1\text{ A}$, $V_{CE} = 5\text{ V}$)	200 150 70 250 250 200 100	320 290 110 335 335 310 295		
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage (Note 4) ($I_C = 100\text{ mA}$, $I_B = 1\text{ mA}$) ($I_C = 500\text{ mA}$, $I_B = 50\text{ mA}$) ($I_C = 1\text{ A}$, $I_B = 50\text{ mA}$) ($I_C = 1\text{ A}$, $I_B = 100\text{ mA}$)		0.080 0.078 0.170 0.143	0.200 0.150 0.250 0.200	V
$V_{BE(sat)}$	Base – Emitter Saturation Voltage (Note 4) ($I_C = 500\text{ mA}$, $I_B = 50\text{ mA}$) ($I_C = 1\text{ A}$, $I_B = 50\text{ mA}$) ($I_C = 1\text{ A}$, $I_B = 100\text{ mA}$)		0.87 0.91 0.94	1.50 1.50 1.60	V
$V_{BE(on)}$	Base-Emitter Turn-on Voltage (Note 4) ($I_C = 1\text{ mA}$, $V_{CE} = 1\text{ V}$) ($I_C = 500\text{ mA}$, $V_{CE} = 2\text{ V}$)	0.27	0.57 0.76	0.90	V

DYNAMIC CHARACTERISTICS

C_{ibo}	Input Capacitance ($V_{EB} = 1\text{ V}$, $f = 1.0\text{ MHz}$)		100		pF
C_{obo}	Output Capacitance ($V_{CB} = 10\text{ V}$, $f = 1.0\text{ MHz}$)		8.0		pF
f_T	Cutoff Frequency ($I_C = 50\text{ mA}$, $V_{CE} = 2.0\text{ V}$, $f = 100\text{ MHz}$)		200		MHz

SWITCHING TIMES

t_d	Delay Time ($V_{CC} = 10\text{ V}$, $I_C = 0.5\text{ A}$, $I_{B1} = 25\text{ mA}$, $I_{B2} = -25\text{ mA}$)		10		ns
t_{on}	ON Time ($V_{CC} = 10\text{ V}$, $I_C = 0.5\text{ A}$, $I_{B1} = 25\text{ mA}$, $I_{B2} = -25\text{ mA}$)		28		ns
t_r	Rise Time ($V_{CC} = 10\text{ V}$, $I_C = 0.5\text{ A}$, $I_{B1} = 25\text{ mA}$, $I_{B2} = -25\text{ mA}$)		18		ns
t_s	Storage Time ($V_{CC} = 10\text{ V}$, $I_C = 0.5\text{ A}$, $I_{B1} = 25\text{ mA}$, $I_{B2} = -25\text{ mA}$)		622		ns
t_{off}	OFF Time ($V_{CC} = 10\text{ V}$, $I_C = 0.5\text{ A}$, $I_{B1} = 25\text{ mA}$, $I_{B2} = -25\text{ mA}$)		709		ns
t_f	Fall Time ($V_{CC} = 10\text{ V}$, $I_C = 0.5\text{ A}$, $I_{B1} = 25\text{ mA}$, $I_{B2} = -25\text{ mA}$)		87		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.

4. Pulse Condition: Pulse Width = 300 μsec , Duty Cycle $\leq 2\%$.

TYPICAL CHARACTERISTICS

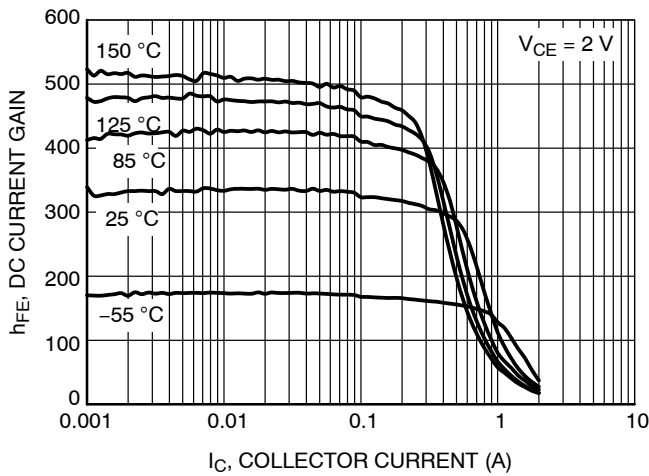


Figure 1. DC Current Gain

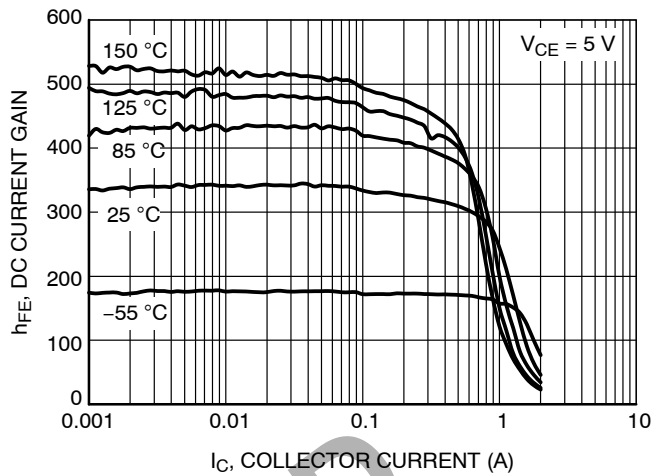


Figure 2. DC Current Gain

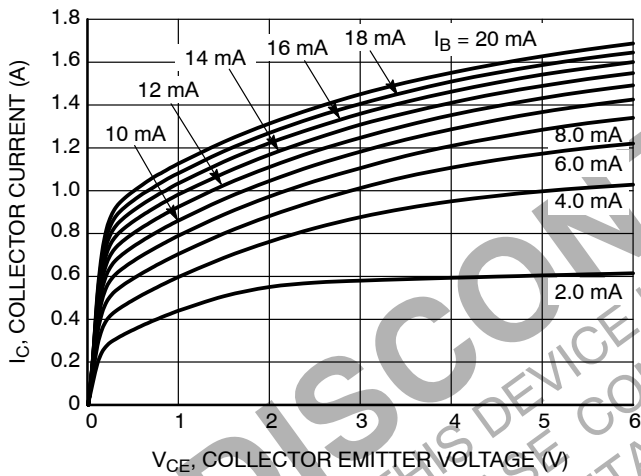


Figure 3. Collector Current as a Function of Collector Emitter Voltage

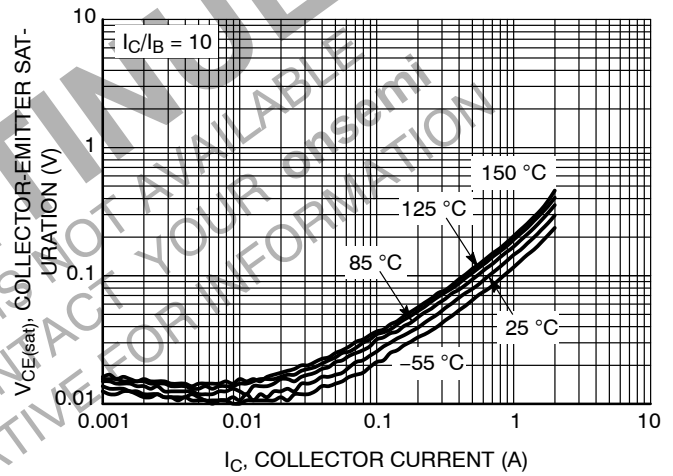


Figure 4. Collector-Emitter Saturation Voltage

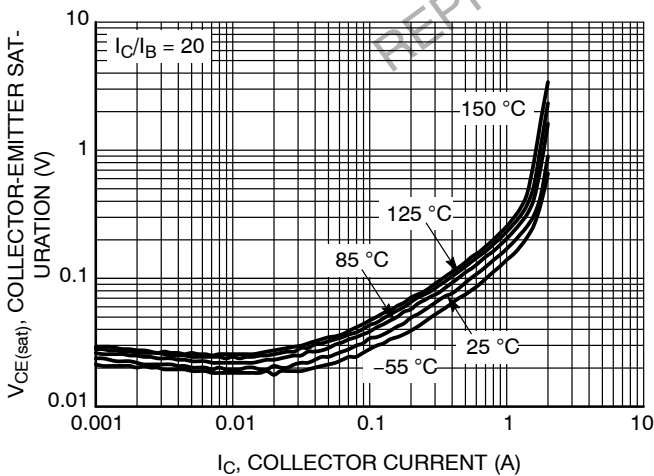


Figure 5. Collector-Emitter Saturation Voltage

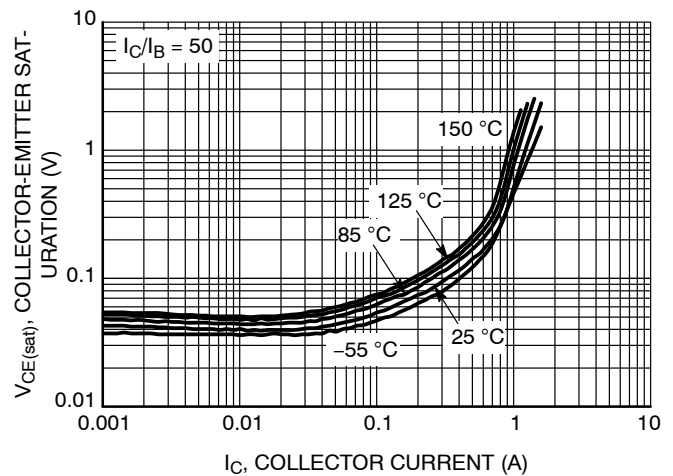


Figure 6. Collector-Emitter Saturation Voltage

TYPICAL CHARACTERISTICS (continued)

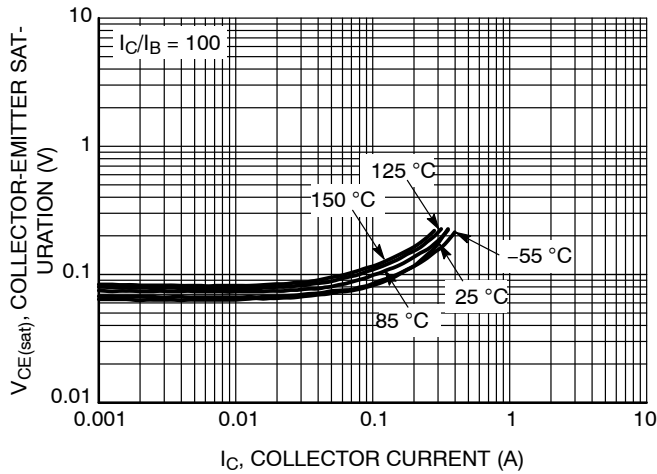


Figure 7. Collector-Emitter Saturation Voltage

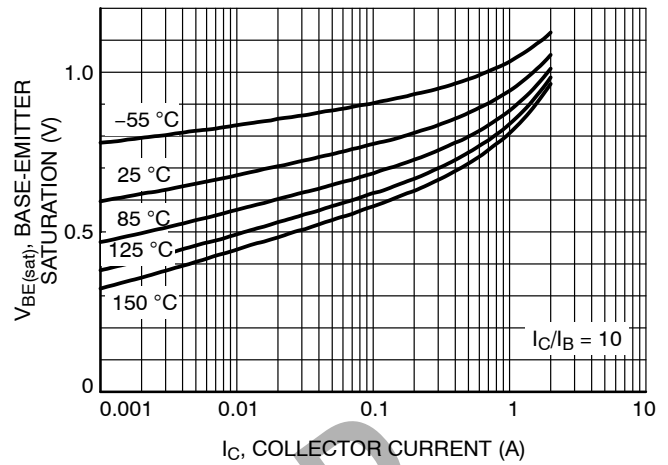


Figure 8. Base-Emitter Saturation Voltage

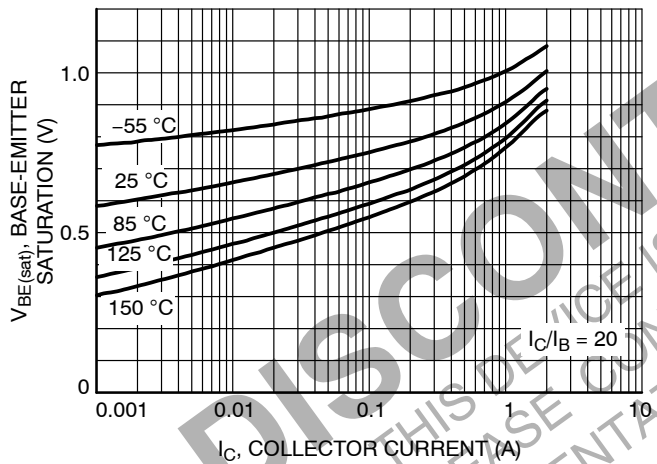


Figure 9. Base-Emitter Saturation Voltage

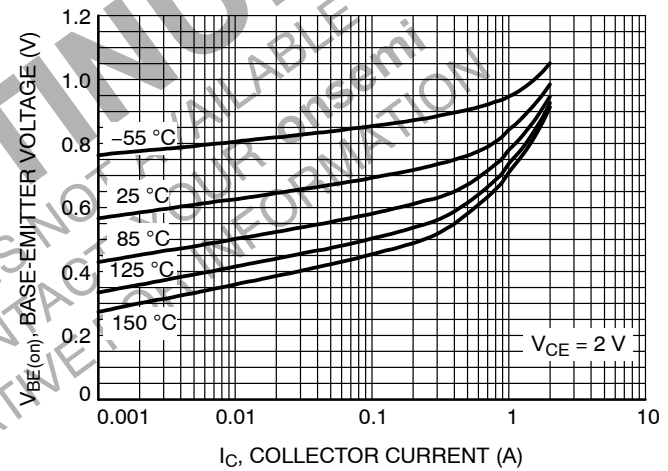


Figure 10. Base-Emitter "ON" Voltage

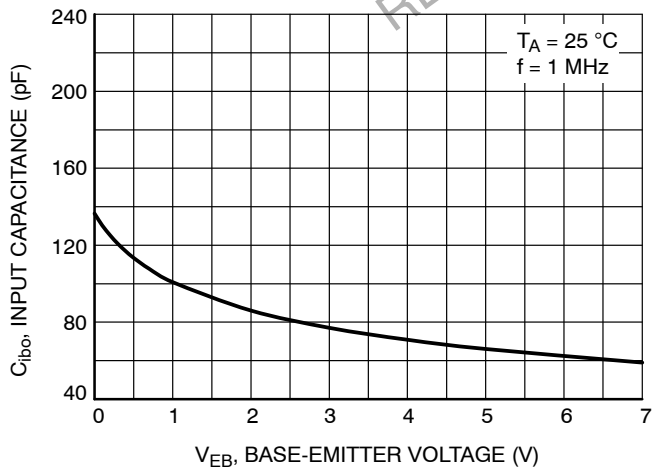


Figure 11. Input Capacitance

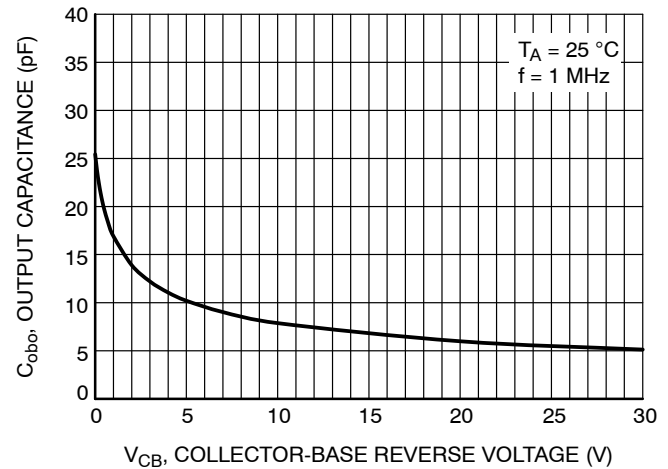
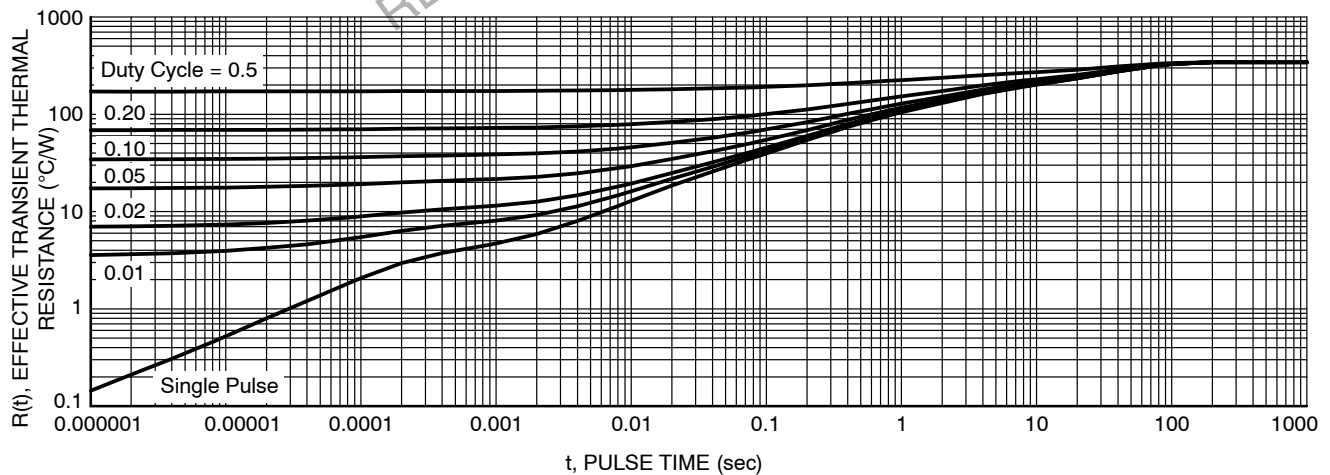
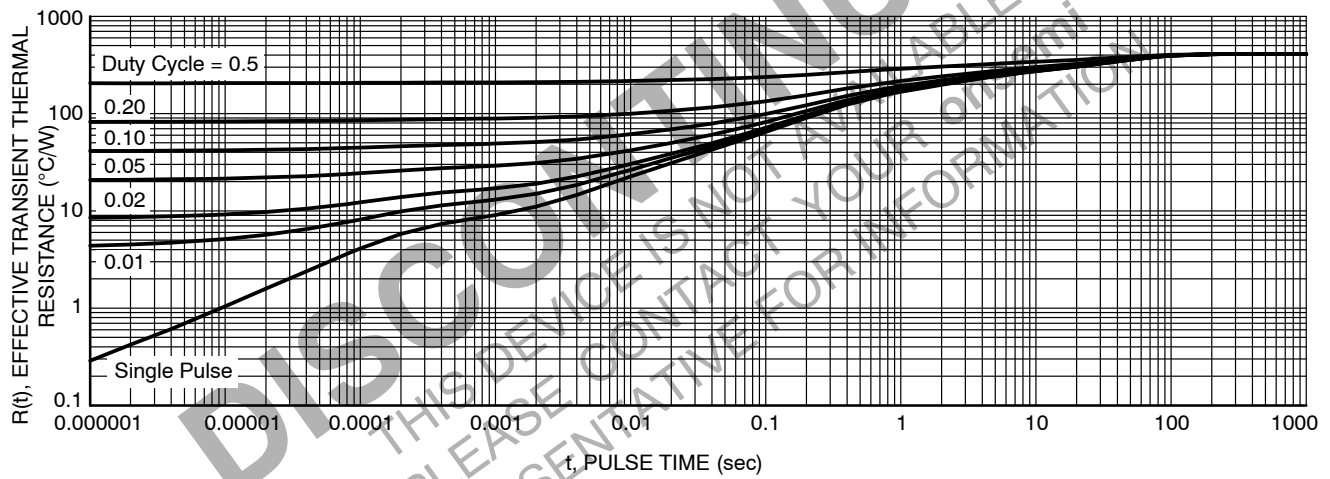
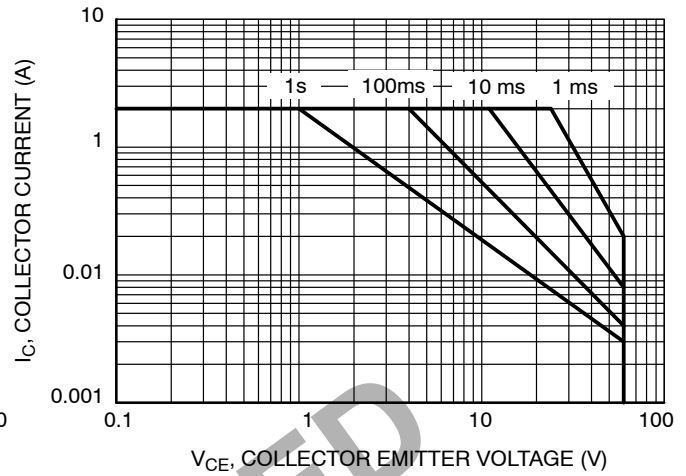
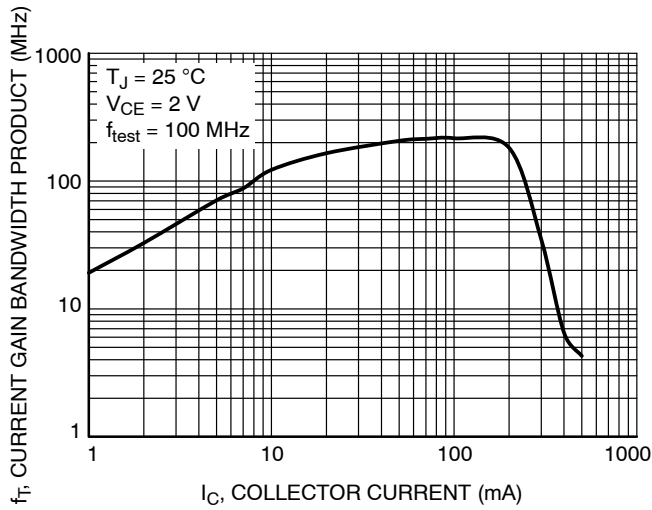


Figure 12. Output Capacitance

TYPICAL CHARACTERISTICS (continued)



NSS60101DMR6

REVISION HISTORY

Revision	Description of Changes	Date
4	NVMFS5C456NLWFT1G, NVMFS5C456NLWFT3G OPN's Marked as Discontinued.	7/16/2025
5	Data Sheet Discontinued.	1/15/2026

This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.

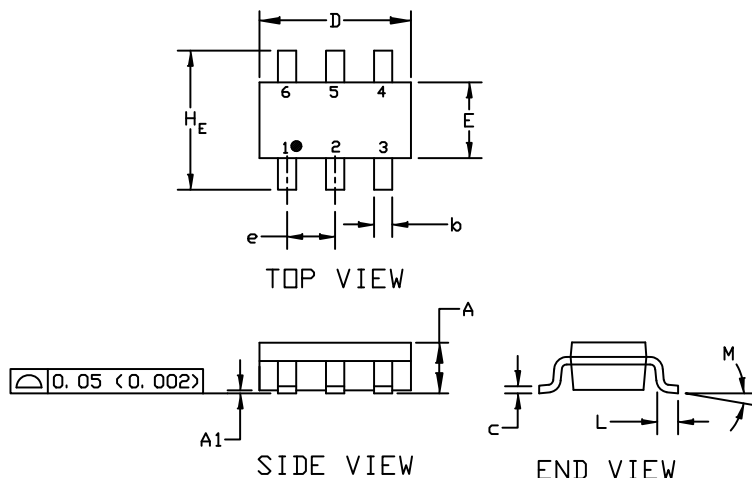
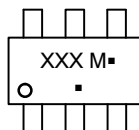
DISCONTINUED
THIS DEVICE IS NOT AVAILABLE
PLEASE CONTACT YOUR onsemi
REPRESENTATIVE FOR INFORMATION



SCALE 2:1

SC-74
CASE 318F
ISSUE P

DATE 07 OCT 2021


GENERIC
MARKING DIAGRAM*


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

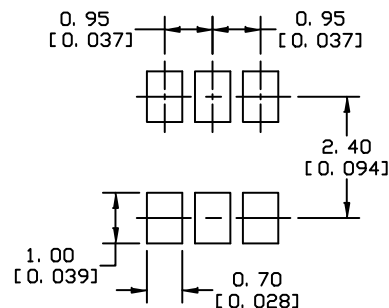
(Note: Microdot may be in either location)

*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.

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994
2. CONTROLLING DIMENSION: INCHES
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.

DIM	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.90	1.00	1.10	0.035	0.039	0.043
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.25	0.37	0.50	0.010	0.015	0.020
c	0.10	0.18	0.26	0.004	0.007	0.010
D	2.90	3.00	3.10	0.114	0.118	0.122
E	1.30	1.50	1.70	0.051	0.059	0.067
e	0.85	0.95	1.05	0.034	0.037	0.041
H _E	2.50	2.75	3.00	0.099	0.108	0.118
L	0.20	0.40	0.60	0.008	0.016	0.024
M	0*	---	10*	0*	---	10*



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

SOLDERING FOOTPRINT

STYLE 1: PIN 1. CATHODE 2. ANODE 3. CATHODE 4. CATHODE 5. ANODE 6. CATHODE	STYLE 2: PIN 1. NO CONNECTION 2. COLLECTOR 3. EMITTER 4. NO CONNECTION 5. COLLECTOR 6. BASE	STYLE 3: PIN 1. EMITTER 1 2. BASE 1 3. COLLECTOR 2 4. EMITTER 2 5. BASE 2 6. COLLECTOR 1	STYLE 4: PIN 1. COLLECTOR 2 2. EMITTER 1/EMITTER 2 3. COLLECTOR 1 4. EMITTER 3 5. BASE 1/BASE 2/COLLECTOR 3 6. BASE 3	STYLE 5: PIN 1. CHANNEL 1 2. ANODE 3. CHANNEL 2 4. CHANNEL 3 5. CATHODE 6. CHANNEL 4	STYLE 6: PIN 1. CATHODE 2. ANODE 3. CATHODE 4. CATHODE 5. CATHODE 6. CATHODE
STYLE 7: PIN 1. SOURCE 1 2. GATE 1 3. DRAIN 2 4. SOURCE 2 5. GATE 2 6. DRAIN 1	STYLE 8: PIN 1. EMITTER 1 2. BASE 2 3. COLLECTOR 2 4. EMITTER 2 5. BASE 1 6. COLLECTOR 1	STYLE 9: PIN 1. EMITTER 2 2. BASE 2 3. COLLECTOR 1 4. EMITTER 1 5. BASE 1 6. COLLECTOR 2	STYLE 10: PIN 1. ANODE/CATHODE 2. BASE 3. EMITTER 4. COLLECTOR 5. ANODE 6. CATHODE	STYLE 11: PIN 1. EMITTER 2. BASE 3. ANODE/CATHODE 4. ANODE 5. CATHODE 6. COLLECTOR	

DOCUMENT NUMBER:	98ASB42973B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SC-74	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