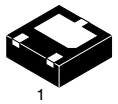
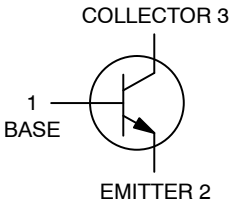
General Purpose Transistor Medium Power, NPN
80 V, 1 A

BCP56M



WDFNW3
CASE 515AA

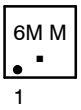
The BCP56MTW is designed for general purpose amplifier applications. It is housed in DFN2020−3 offering superior thermal performance. The transistor is ideal for medium−power surface mount applications where board space and reliability are at a premium.



Specification Features

- Wettable Flank Package for Optimal Automated Optical Inspection (AOI)
- 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

MARKING DIAGRAM



6M = Specific Device Code
M = Date Code

ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 2 of this data sheet.

MAXIMUM RATINGS (T_A = 25°C)

Rating	Symbol	Max	Unit
Collector−Emitter Voltage	V_{CEO}	80	Vdc
Collector−Base Voltage	V_{CBO}	100	Vdc
Emitter−Base Voltage	V_{EBO}	6.0	Vdc
Collector Current − Continuous (Note 1)	I_C	1.0	A
Collector Current − Peak (Note 1)	I_{CM}	2.0	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

Characteristic	Symbol	Max	Unit
Total Power Dissipation (Note 2) @ T_A = 25°C Derate above 25°C	P_D	1.5	W
Thermal Resistance, Junction−to−Ambient (Note 2)	$R_{\theta JA}$	78	°C/W
Total Power Dissipation (Note 3) @ T_A = 25°C Derate above 25°C	P_D	875	mW
Thermal Resistance, Junction−to−Ambient (Note 3)	$R_{\theta JA}$	138	°C/W
Junction and Storage Temperature Range	T_J, T_{stg}	−65 to +150	°C

1. Reference SOA Curve
2. Surface−mounted on FR4 board using a 600 mm^2 pad area and 2 oz. Cu
3. Surface−mounted on FR4 board using a 100 mm^2 pad area and 2 oz. Cu

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

Characteristics		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector−Emitter Breakdown Voltage (I_C = 1 mA, I_B = 0 A)		$V_{(BR)CEO}$	80	–	–	V
Collector−Base Breakdown Voltage (I_C = 100 μA, I_E = 0 A)		$V_{(BR)CBO}$	100	–	–	V
Emitter−Base Breakdown Voltage (I_E = 10 μA, I_C = 0)		$V_{(BR)EBO}$	5	–	–	V
Collector−Base Cutoff Current (V_{CB} = 30 V, I_E = 0)		I_{CBO}	–	–	100	nA
Emitter−Base Cutoff Current (V_{EB} = 5 V, I_C = 0)		I_{EBO}	–	–	100	nA
ON CHARACTERISTICS (Note 4)						
DC Current Gain		h_{FE}				
(I_C = 5 mA, V_{CE} = 2.0 V)	All Part Types		63	–	–	
(I_C = 150 mA, V_{CE} = 2.0 V)	BCP56M		63	–	250	
	BCP5610M		63	–	160	
	BCP5616M		100	–	250	
(I_C = 500 mA, V_{CE} = 2.0 V)	All Part Types		40	–	–	
Collector−Emitter Saturation Voltage (I_C = 500 mA, I_B = 50 mA)		$V_{CE(sat)}$	–	–	0.50	V
Base−Emitter Saturation Voltage (I_C = 500 mA, I_B = 50 mA)		$V_{BE(sat)}$	–	–	2.0	V
Base−Emitter Turn−on Voltage (I_C = 500 mA, V_{CE} = 2.0 V)		$V_{BE(on)}$	–	–	1.0	V
SMALL SIGNAL CHARACTERISTICS						
Transition Frequency (I_C = 10 mA, V_{CE} = 5.0 V, f = 100 MHz)		f_T	–	140	–	MHz
Output Capacitance (V_{CB} = 10 V, f = 1.0 MHz)		C_{obo}	–	65	–	pF
Input Capacitance (V_{EB} = −0.5 Vdc, I_C = 0, f = 1.0 MHz)		C_{ibo}	–	130	–	pF
Input Impedance (I_C = −1.0 mAdc, V_{CE} = −10 Vdc, f = 1.0 kHz)		h_{ie}	–	4	–	k
Voltage Feedback Ratio (I_C = −1.0 mAdc, V_{CE} = −10 Vdc, f = 1.0 kHz)		h_{re}	–	0.4	–	X 10^{-4}
Small−Signal Current Gain (I_C = −1.0 mAdc, V_{CE} = −10 Vdc, f = 1.0 kHz)		h_{fe}	–	135	–	–
Output Admittance (I_C = −1.0 mAdc, V_{CE} = −10 Vdc, f = 1.0 kHz)		H_{oe}	–	4	–	μmhos
Noise Figure (I_C = 0.2 mA, V_{CE} = 5.0 Vdc, R_S = 2.0 kΩ, f = 1.0 kHz, BW = 200 Hz)		NF	–	1	–	dB
SWITCHING CHARACTERISTICS						
Delay Time (V_{CC} = 30 Vdc, I_C = 150 mA, I_{B1} = 15 mA)		t_d	–	20	–	ns
Rise Time (V_{CC} = 30 Vdc, I_C = 150 mA, I_{B1} = 15 mA)		t_r	–	20	–	ns
Storage Time (V_{CC} = 30 Vdc, I_C = 150 mA, I_{B1} = 15 mA, I_{B2} = 15 mA)		t_s	–	900	–	ns
Fall Time (V_{CC} = 30 Vdc, I_C = 150 mA, I_{B1} = 15 mA, I_{B2} = 15 mA)		t_f	–	110	–	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 μs, Duty Cycle ≤ 2%.

ORDERING INFORMATION

Device	Marking	Package	Shipping†
BCP56MTWG	6M	WDFNW3 (Pb−Free)	3000 / Tape & Reel
BCP5610MTWG	6N		
BCP5616MTWG	6P		
NSVBCP56MTWG*	6M		
NSVBCP5610MTWG*	6N		
NSVBCP5616MTWG*	6P		

†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−Q100 Qualified and PPAP Capable.

TYPICAL CHARACTERISTICS

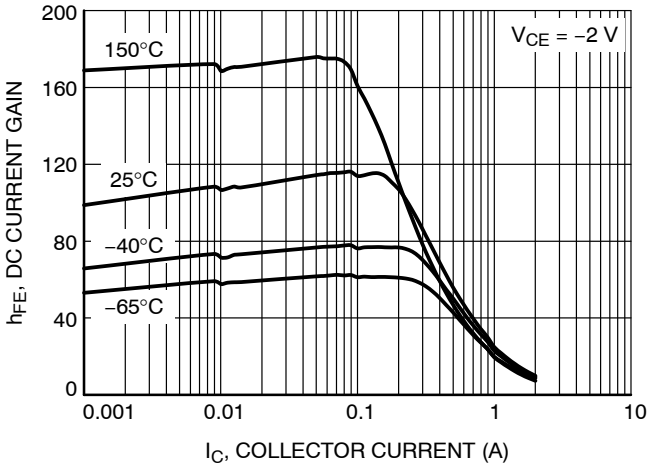


Figure 1. DC Current Gain

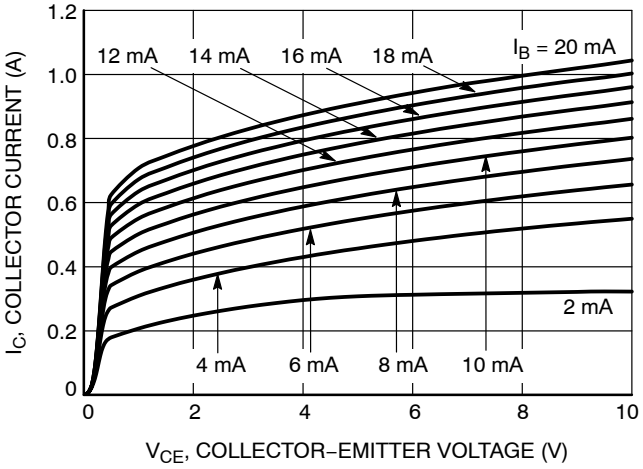


Figure 2. Collector Current vs. Collector Emitter Voltage

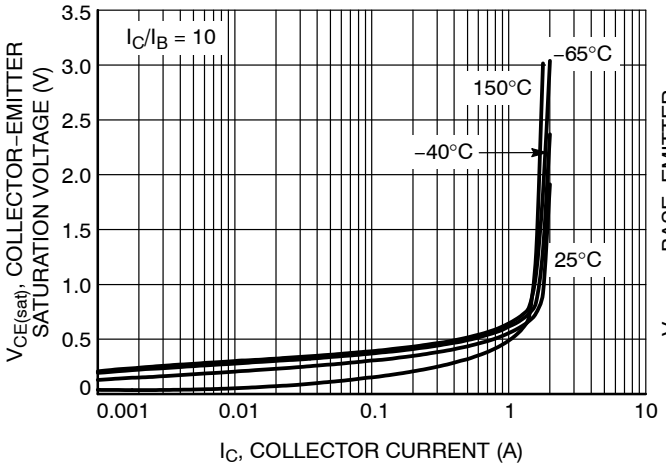


Figure 3. Collector Emitter Saturation Voltage vs. Collector Current

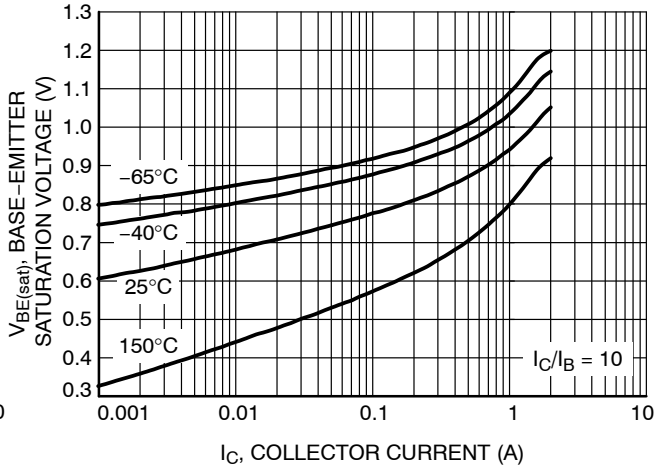


Figure 4. Base Emitter Saturation Voltage vs. Collector Current

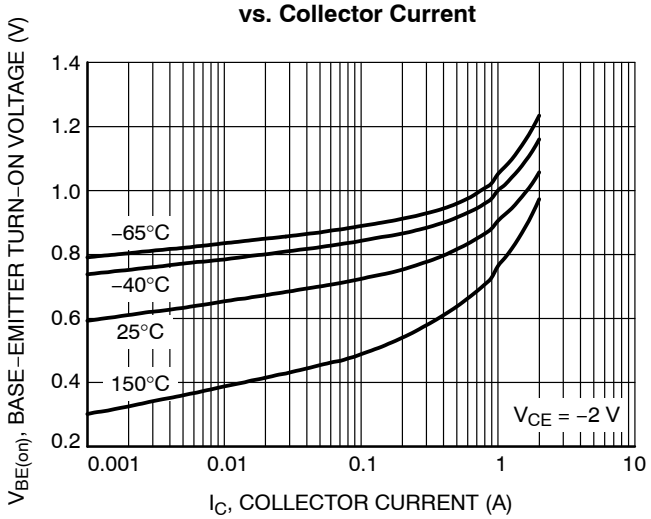


Figure 5. BCP53M, Base Emitter Turn−On Voltage vs. Collector Current $V_{BE(on)}$

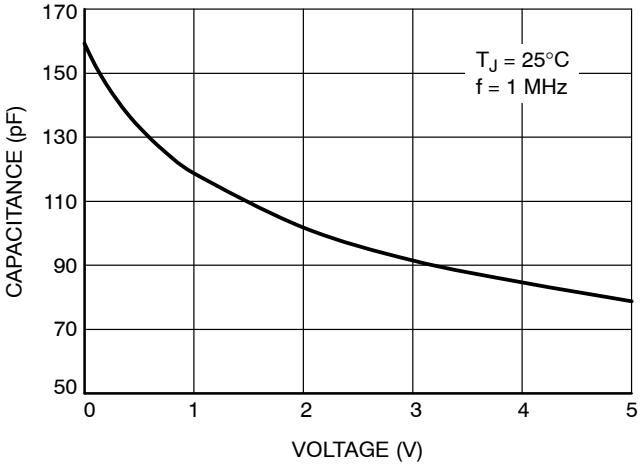


Figure 6. Input Capacitance

TYPICAL CHARACTERISTICS

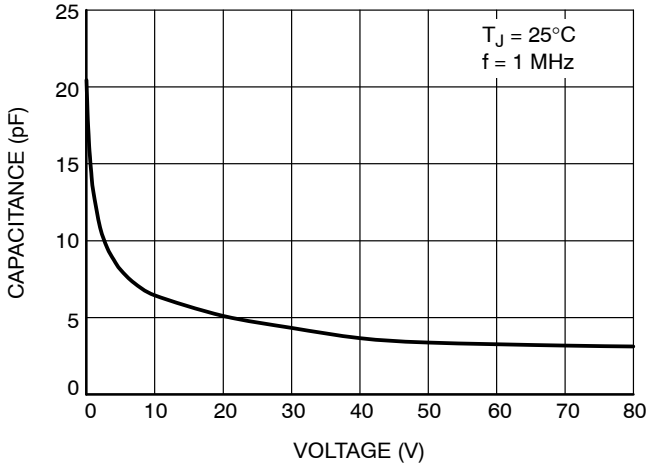


Figure 7. Output Capacitance

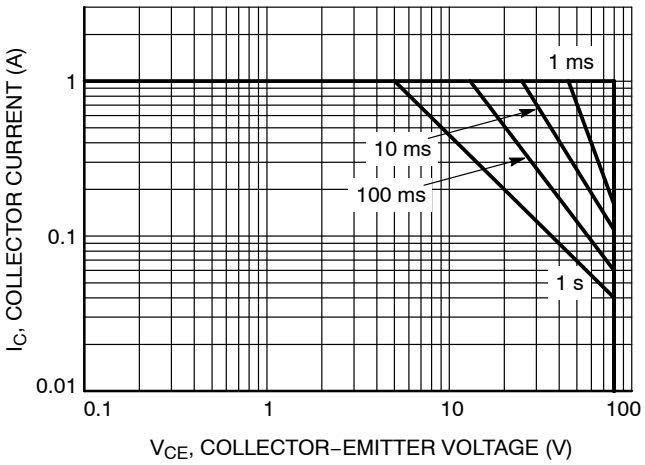


Figure 8. Safe Operating Area

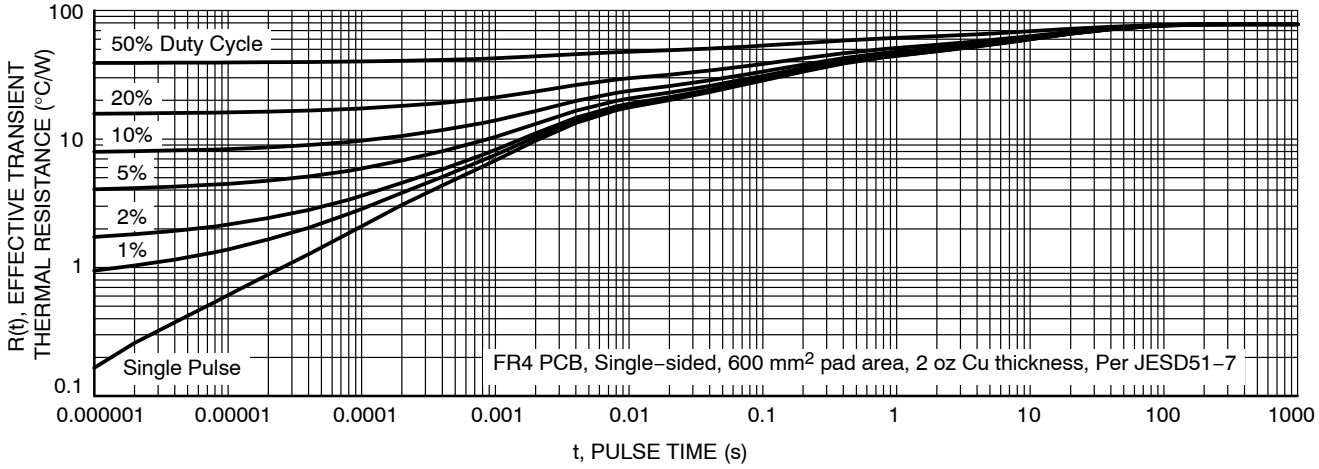


Figure 9. Transient Thermal Impedance from Junction−to−Ambient as a Function of Pulse Duration

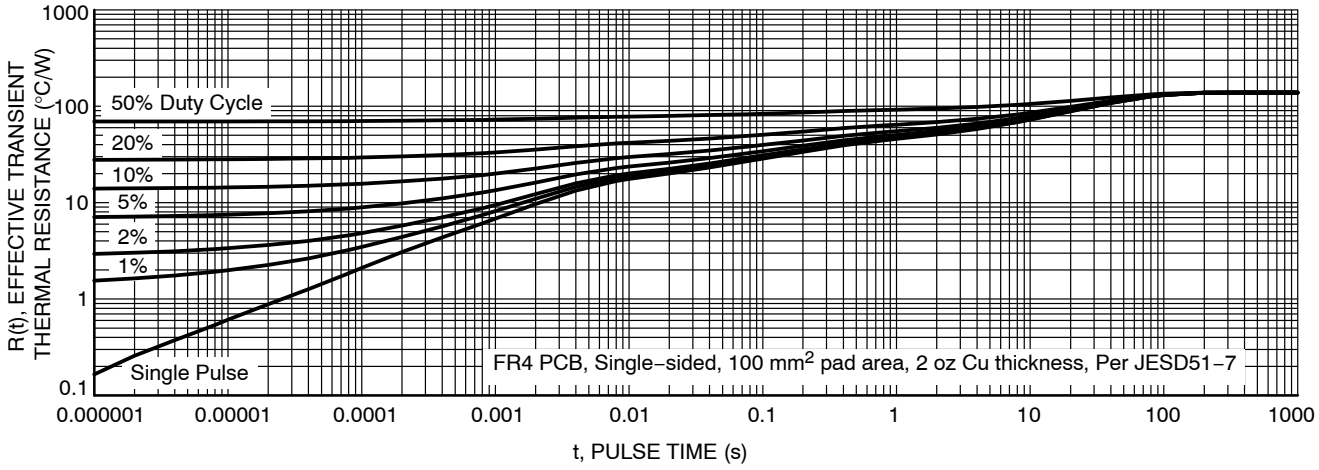
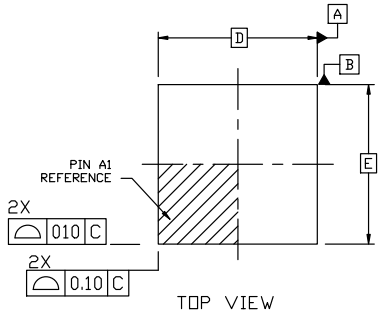


Figure 10. Transient Thermal Impedance from Junction−to−Ambient as a Function of Pulse Duration

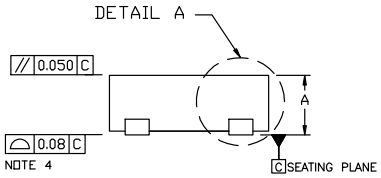
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

WDFNW3 2x2, 1.3P
CASE 515AA
ISSUE A

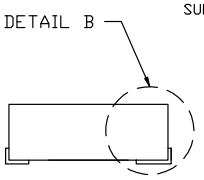
DATE 26 JUL 2022



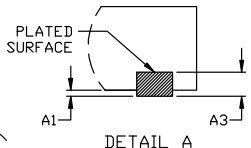
TOP VIEW



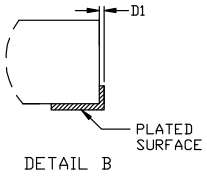
SIDE VIEW



END VIEW



DETAIL A

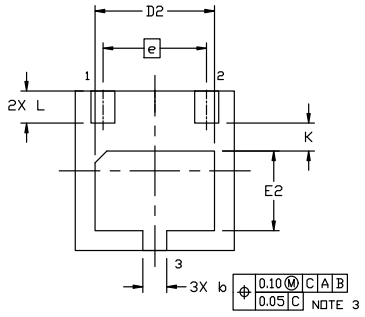


DETAIL B

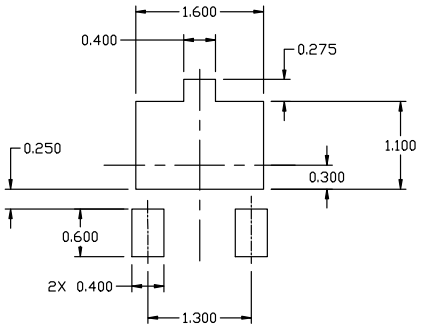
NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30MM FORM THE TERMINAL TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PADS AS WELL AS THE TERMINALS.

	MILLIMETERS		
DIM	MIN.	NOM.	MAX.
A	0.70	0.75	0.80
A1	0.00	---	0.05
A3	0.20 REF		
b	0.25	0.30	0.35
D	2.00 BSC		
D1	0.00	---	0.04
D2	1.40	1.50	1.60
E	2.00 BSC		
E2	0.90	1.00	1.10
e	1.30 BSC		
K	0.35 REF		
L	0.35	0.40	0.45



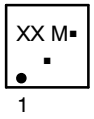
BOTTOM VIEW



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, SOLDERRM/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.

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DESCRIPTION:	**WDFNW3 2x2, 1.3P**	**PAGE 1 OF 1**

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