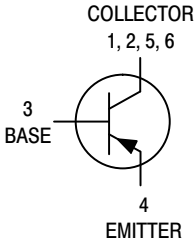
High Current Surface Mount PNP Silicon Switching Transistor for Load Management in Portable Applications

MBT35200MT1

35 VOLTS
2.0 AMPS
PNP TRANSISTOR

CASE 318G
TSOP−6
STYLE 6



Features

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

MAXIMUM RATINGS (T_A = 25°C)

Rating	Symbol	Max	Unit
Collector-Emitter Voltage	V_{CEO}	−35	Vdc
Collector-Base Voltage	V_{CBO}	−55	Vdc
Emitter-Base Voltage	V_{EBO}	−5.0	Vdc
Collector Current − Continuous	I_C	−2.0	Adc
Collector Current − Peak	I_{CM}	−5.0	A
Electrostatic Discharge	ESD	HBM Class 3 MM Class C	

THERMAL CHARACTERISTICS

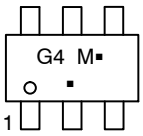
Characteristic	Symbol	Max	Unit
Total Device Dissipation T_A = 25°C Derate above 25°C	P_D (Note 1)	 625 5.0	 mW mW/°C
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$ (Note 1)	 200	 °C/W
Total Device Dissipation T_A = 25°C Derate above 25°C	P_D (Note 2)	 1.0 8.0	 W mW/°C
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$ (Note 2)	 120	 °C/W
Thermal Resistance, Junction−to−Lead #1	$R_{\theta JL}$	 80	 °C/W
Total Device Dissipation (Single Pulse < 10 sec.)	$P_{Dsingle}$ (Notes 2 & 3)	 1.75	 W
Junction and Storage Temperature Range	T_J, T_{stg}	−55 to +150	 °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.

1. FR−4 @ Minimum Pad
2. FR−4 @ 1.0 X 1.0 inch Pad
3. ref: Figure 9

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

MARKING DIAGRAM



G4 = Specific Device Code
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
MBT35200MT1G	TSOP−6 (Pb−Free)	3,000 / Tape & Reel

DISCONTINUED (Note 1)

SMBT35200MT1G	TSOP−6 (Pb−Free)	3,000 / 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.

1. **DISCONTINUED:** This device is not recommended for new design. Please contact your **onsemi** representative for information. The most current information on this device may be available on www.onsemi.com.

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

Characteristic	Symbol	Min	Typical	Max	Unit
OFF CHARACTERISTICS					
Collector – Emitter Breakdown Voltage (I_C = −10 mAdc, I_B = 0)	$V_{(BR)CEO}$	−35	−45	–	Vdc
Collector – Base Breakdown Voltage (I_C = −0.1 mAdc, I_E = 0)	$V_{(BR)CBO}$	−55	−65	–	Vdc
Emitter – Base Breakdown Voltage (I_E = −0.1 mAdc, I_C = 0)	$V_{(BR)EBO}$	−5.0	−7.0	–	Vdc
Collector Cutoff Current (V_{CB} = −35 Vdc, I_E = 0)	I_{CBO}	–	−0.03	−0.1	μAdc
Collector–Emitter Cutoff Current (V_{CES} = −35 Vdc)	I_{CES}	–	−0.03	−0.1	μAdc
Emitter Cutoff Current (V_{EB} = −4.0 Vdc)	I_{EBO}	–	−0.01	−0.1	μAdc
ON CHARACTERISTICS					
DC Current Gain (Note 1) (I_C = −1.0 A, V_{CE} = −1.5 V) (I_C = −1.5 A, V_{CE} = −1.5 V) (I_C = −2.0 A, V_{CE} = −3.0 V)	h_{FE}	 100 100 100	 200 200 200	 – 400 –	
Collector – Emitter Saturation Voltage (Note 1) (I_C = −0.8 A, I_B = −0.008 A) (I_C = −1.2 A, I_B = −0.012 A) (I_C = −2.0 A, I_B = −0.02 A)	$V_{CE(sat)}$	 – – –	 −0.125 −0.175 −0.260	 −0.15 −0.20 −0.31	V
Base – Emitter Saturation Voltage (Note 1) (I_C = −1.2 A, I_B = −0.012 A)	$V_{BE(sat)}$	–	−0.68	−0.85	V
Base – Emitter Turn−on Voltage (Note 1) (I_C = −2.0 A, V_{CE} = −3.0 V)	$V_{BE(on)}$	–	−0.81	−0.875	V
Cutoff Frequency (I_C = −100 mA, V_{CE} = −5.0 V, f = 100 MHz)	f_T	100	–	–	MHz
Input Capacitance (V_{EB} = −0.5 V, f = 1.0 MHz)	Cibo	–	600	650	pF
Output Capacitance (V_{CB} = −3.0 V, f = 1.0 MHz)	Cobo	–	85	100	pF
Turn−on Time (V_{CC} = −10 V, I_{B1} = −100 mA, I_C = −1 A, R_L = 3 Ω)	t_{on}	–	35	–	nS
Turn−off Time (V_{CC} = −10 V, I_{B1} = I_{B2} = −100 mA, I_C = 1 A, R_L = 3 Ω)	t_{off}	–	225	–	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.

1. Pulsed Condition: Pulse Width = 300 μsec, Duty Cycle ≤ 2%

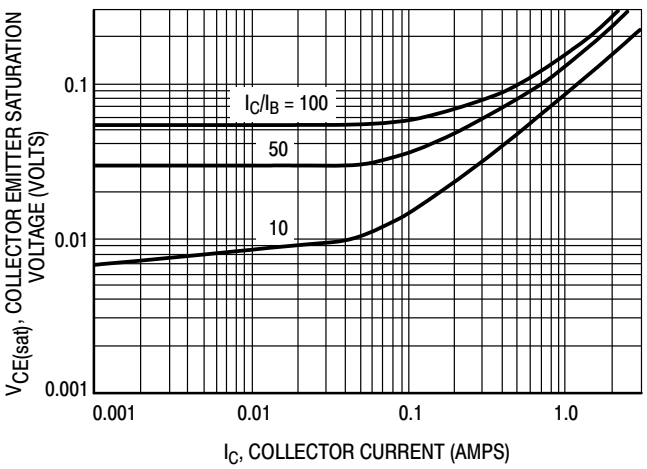


Figure 1. Collector Emitter Saturation Voltage versus Collector Current

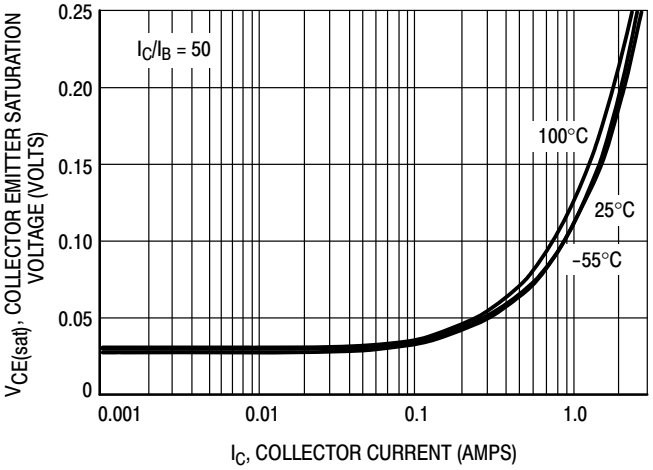


Figure 2. Collector Emitter Saturation Voltage versus Collector Current

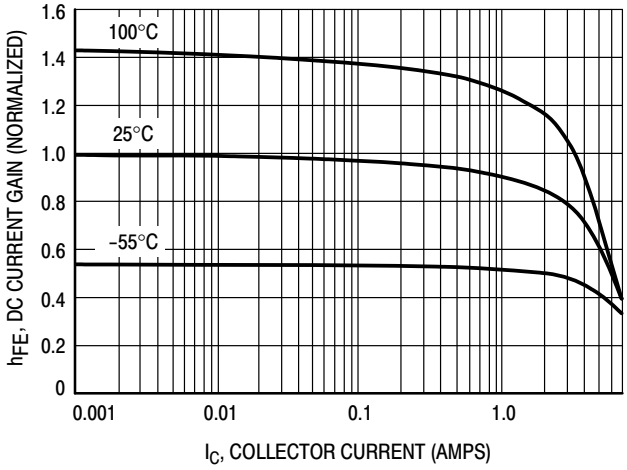


Figure 3. DC Current Gain versus Collector Current

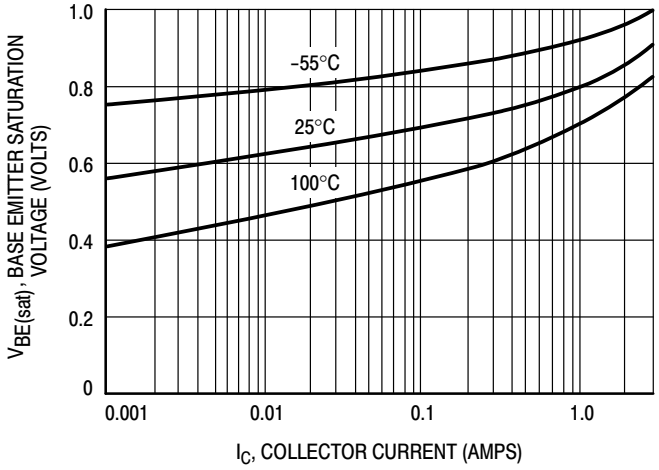


Figure 4. Base Emitter Saturation Voltage versus Collector Current

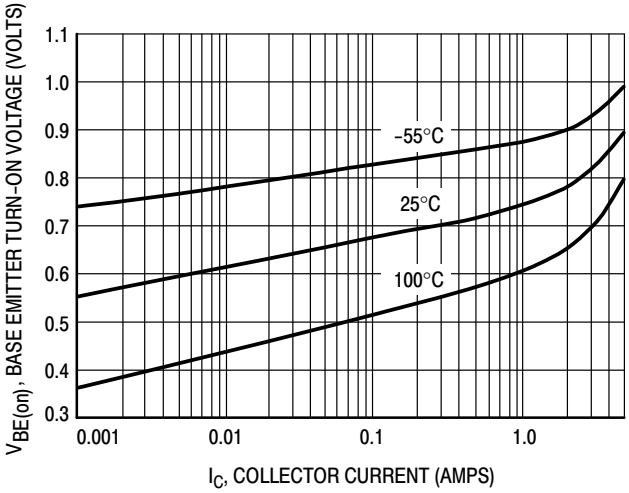


Figure 5. Base Emitter Turn−On Voltage versus Collector Current

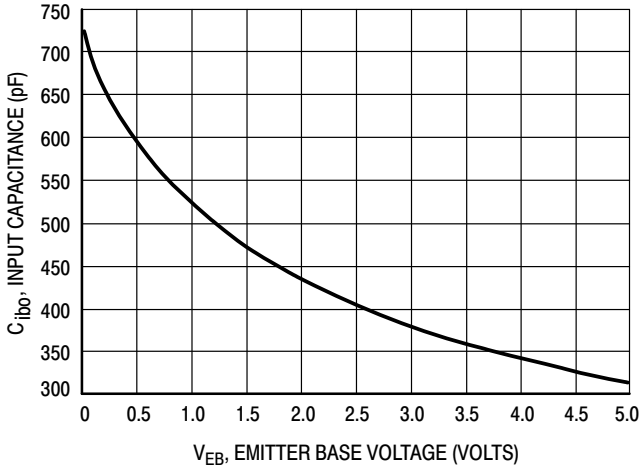


Figure 6. Input Capacitance

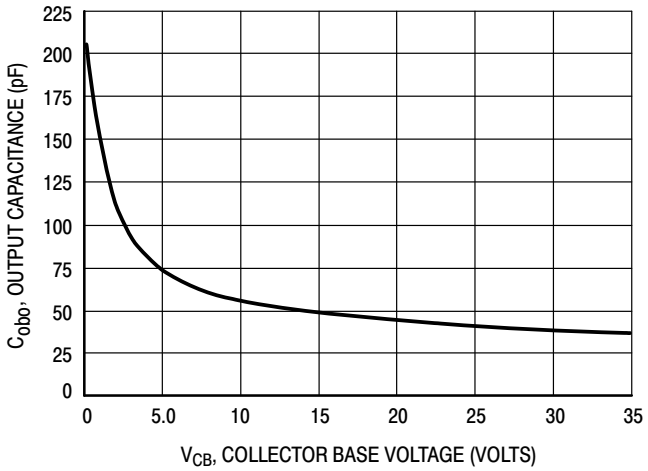


Figure 7. Output Capacitance

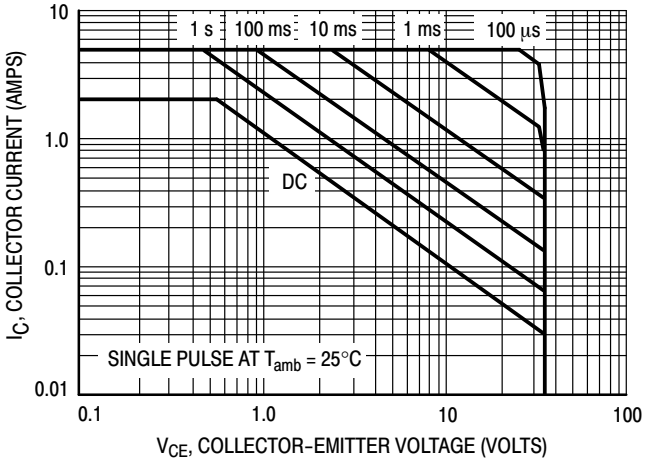


Figure 8. Safe Operating Area

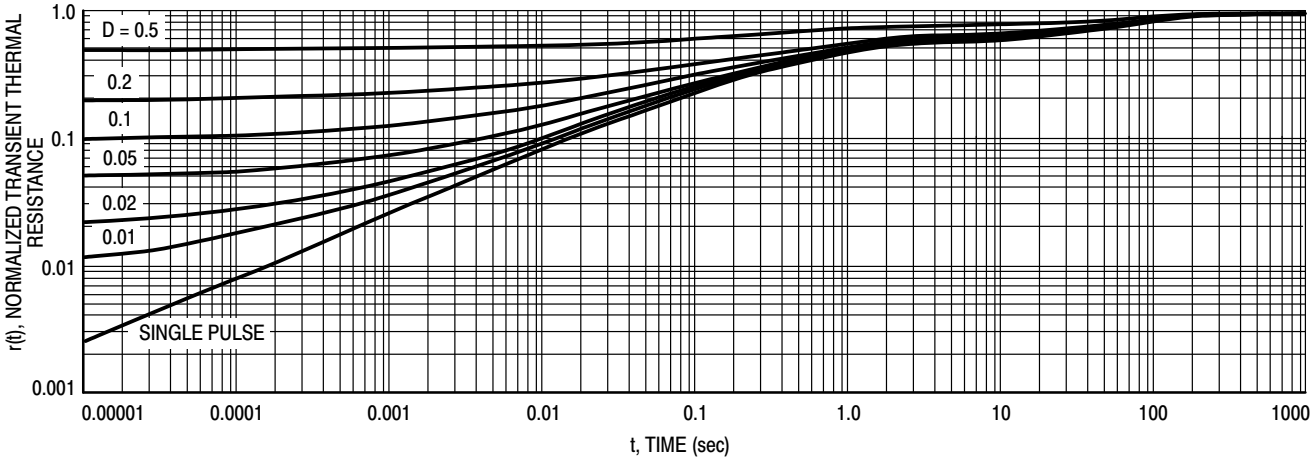
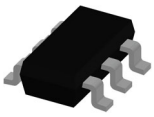
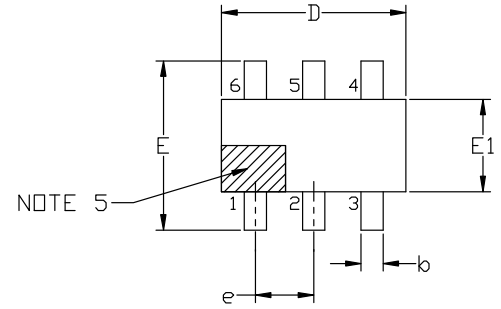


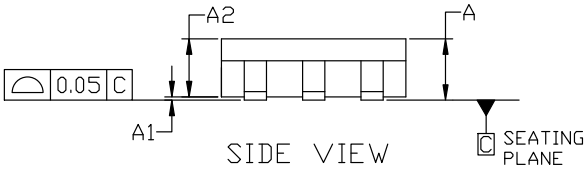
Figure 9. Normalized Thermal Response

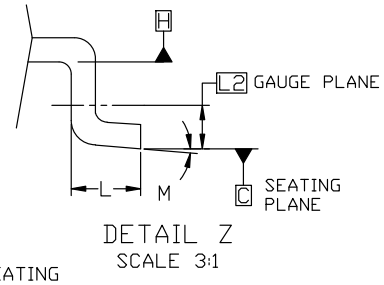


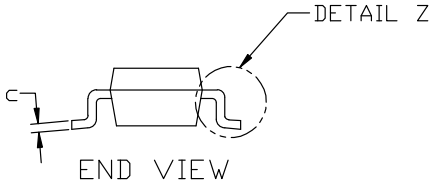
TSOP−6 3.00x1.50x0.90, 0.95P
CASE 318G
ISSUE W

DATE 26 FEB 2024



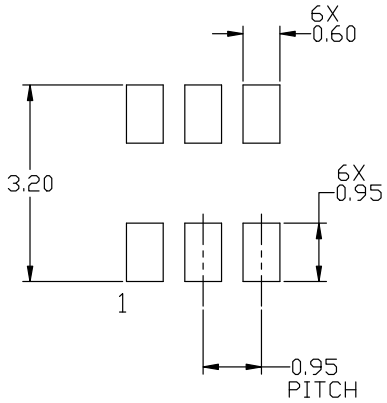






NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSIONS D AND E1 ARE DETERMINED AT DATUM H.
5. PIN 1 INDICATOR MUST BE LOCATED IN THE INDICATED ZONE

MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.90	1.00	1.10
A1	0.01	0.06	0.10
A2	0.80	0.90	1.00
b	0.25	0.38	0.50
c	0.10	0.18	0.26
D	2.90	3.00	3.10
E	2.50	2.75	3.00
E1	1.30	1.50	1.70
e	0.85	0.95	1.05
L	0.20	0.40	0.60
L2	0.25 BSC		
M	0°	---	10°



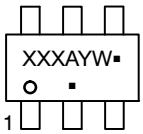
RECOMMENDED MOUNTING FOOTPRINT

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

TSOP−6 3.00x1.50x0.90, 0.95P
CASE 318G
ISSUE W

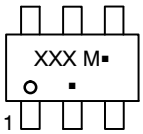
DATE 26 FEB 2024

GENERIC MARKING DIAGRAM*



IC

XXX = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
▪ = Pb−Free Package



STANDARD

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

*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. DRAIN
2. DRAIN
3. GATE
4. SOURCE
5. DRAIN
6. DRAIN

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

STYLE 3:
PIN 1. ENABLE
2. N/C
3. R BOOST
4. Vz
5. V in
6. V out

STYLE 4:
PIN 1. N/C
2. V in
3. NOT USED
4. GROUND
5. ENABLE
6. LOAD

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

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

STYLE 7:
PIN 1. COLLECTOR
2. COLLECTOR
3. BASE
4. N/C
5. COLLECTOR
6. EMITTER

STYLE 8:
PIN 1. Vbus
2. D(in)
3. D(in)+
4. D(out)+
5. D(out)
6. GND

STYLE 9:
PIN 1. LOW VOLTAGE GATE
2. DRAIN
3. SOURCE
4. DRAIN
5. DRAIN
6. HIGH VOLTAGE GATE

STYLE 10:
PIN 1. D(OUT)+
2. GND
3. D(OUT)−
4. D(IN)−
5. VBUS
6. D(IN)+

STYLE 11:
PIN 1. SOURCE 1
2. DRAIN 2
3. DRAIN 2
4. SOURCE 2
5. GATE 1
6. DRAIN 1/GATE 2

STYLE 12:
PIN 1. I/O
2. GROUND
3. I/O
4. I/O
5. VCC
6. I/O

STYLE 13:
PIN 1. GATE 1
2. SOURCE 2
3. GATE 2
4. DRAIN 2
5. SOURCE 1
6. DRAIN 1

STYLE 14:
PIN 1. ANODE
2. SOURCE
3. GATE
4. CATHODE/DRAIN
5. CATHODE/DRAIN
6. CATHODE/DRAIN

STYLE 15:
PIN 1. ANODE
2. SOURCE
3. GATE
4. DRAIN
5. N/C
6. CATHODE

STYLE 16:
PIN 1. ANODE/CATHODE
2. BASE
3. EMITTER
4. COLLECTOR
5. ANODE
6. CATHODE

STYLE 17:
PIN 1. EMITTER
2. BASE
3. ANODE/CATHODE
4. ANODE
5. CATHODE
6. COLLECTOR

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