NSS60600MZ4

Low $V_{CE(sat)}$ Transistor, PNP, 60 V, 6.0 A, SOT-223 Package

ON Semiconductor's e^2PowerEdge family of low $V_{CE(sat)}$ transistors are 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 power management in portable and battery powered products such as cellular and cordless phones, PDAs, computers, printers, digital cameras and MP3 players. Other applications are low voltage motor controls in mass storage products such as disc drives and tape drives. In the automotive industry they can be used in air bag deployment and in the instrument cluster. The high current gain allows e^2PowerEdge devices to be driven directly from PMU's control outputs, and the Linear Gain (Beta) makes them ideal components in analog amplifiers.

Features

- Complementary to NSS60601MZ4
- 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°C)

Rating	Symbol	Max	Unit
Collector-Emitter Voltage	V_{CEO}	−60	Vdc
Collector-Base Voltage	V_{CBO}	−100	Vdc
Emitter-Base Voltage	V_{EBO}	−6.0	Vdc
Collector Current – Continuous	I_C	−6.0	A
Collector Current – Peak	I_{CM}	−12.0	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.
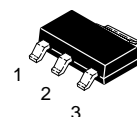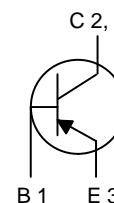
ON Semiconductor®

www.onsemi.com

−60 VOLTS, 6.0 AMPS
2.0 WATTS
PNP LOW $V_{CE(sat)}$ TRANSISTOR
EQUIVALENT $R_{DS(on)}$ 50 mΩ

SOT−223
CASE 318E
STYLE 1

C 2, 4

B 1   E 3

MARKING DIAGRAM

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AYW
60600■
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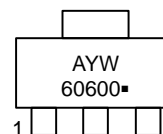
A	= Assembly Location
Y	= Year
W	= Work Week
60600	= Specific Device Code
■	= Pb−Free Package

PIN ASSIGNMENT

4
C

B	C	E
1	2	3
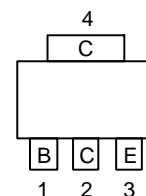
Top View Pinout

ORDERING INFORMATION

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

NSS60600MZ4

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit

Total Device Dissipation
  $T_A = 25°C$
  Derate above 25°C
	P_D (Note 1)	800
		6.5
			mW
			mW/°C

Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$ (Note 1)	155	°C/W

Total Device Dissipation
  $T_A = 25°C$
  Derate above 25°C
	P_D (Note 2)	2
		15.6
			W
			mW/°C

Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$ (Note 2)	64	°C/W
Total Device Dissipation (Single Pulse < 10 sec.)	$P_{Dsingle}$ (Note 3)	710	mW
Junction and Storage Temperature Range	T_J, T_{stg}	−55 to +150	°C

1. FR−4 @ 7.6 mm^2, 1 oz. copper traces.
2. FR−4 @ 645 mm^2, 1 oz. copper traces.
3. Thermal response.

ORDERING INFORMATION

Device	Package	Shipping†
NSS60600MZ4T1G	SOT−223 (Pb−Free)	1,000 / Tape & Reel
NSV60600MZ4T1G	SOT−223 (Pb−Free)	1,000 / Tape & Reel
NSS60600MZ4T3G	SOT−223 (Pb−Free)	4,000 / Tape & Reel
NSV60600MZ4T3G	SOT−223 (Pb−Free)	4,000 / 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.

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage (I_C = –10 mAdc, I_B = 0)	$V_{(BR)CEO}$	–60	–	–	Vdc
Collector–Base Breakdown Voltage (I_C = –0.1 mAdc, I_E = 0)	$V_{(BR)CBO}$	–100	–	–	Vdc
Emitter–Base Breakdown Voltage (I_E = –0.1 mAdc, I_C = 0)	$V_{(BR)EBO}$	–6.0	–	–	Vdc
Collector Cutoff Current (V_{CB} = –100 Vdc, I_E = 0)	I_{CBO}	–	–	–0.1	μAdc
Emitter Cutoff Current (V_{EB} = –6.0 Vdc)	I_{EBO}	–	–	–0.1	μAdc
ON CHARACTERISTICS					
DC Current Gain (Note 4) (I_C = –500 mA, V_{CE} = –2.0 V) (I_C = –1.0 A, V_{CE} = –2.0 V) (I_C = –2.0 A, V_{CE} = –2.0 V) (I_C = –6.0 A, V_{CE} = –2.0 V)	h_{FE}	 150 120 100 70	 – – – –	 – 360 – –	–
Collector–Emitter Saturation Voltage (Note 4) (I_C = –0.1 A, I_B = –2.0 mA) (I_C = –1.0 A, I_B = –0.100 A) (I_C = –2.0 A, I_B = –0.200 A) (I_C = –3.0 A, I_B = –60 mA) (I_C = –6.0 A, I_B = –0.6 A)	$V_{CE(sat)}$	 – – – – –	 – –0.050 –0.100 – –	 –0.050 –0.070 –0.120 –0.250 –0.350	V
Base–Emitter Saturation Voltage (Note 4) (I_C = –1.0 A, I_B = –0.1 A)	$V_{BE(sat)}$	 –	 –	 –1.0	V
Base–Emitter Turn–on Voltage (Note 4) (I_C = –1.0 A, V_{CE} = –2.0 V)	$V_{BE(on)}$	 –	 –	 –0.900	V
Cutoff Frequency (I_C = –500 mA, V_{CE} = –10 V, f = 1.0 MHz)	f_T	 100	 –	 –	MHz
Input Capacitance (V_{EB} = 5.0 V, f = 1.0 MHz)	Cibo	–	360	–	pF
Output Capacitance (V_{CB} = 10 V, f = 1.0 MHz)	Cobo	–	60	–	pF
SWITCHING CHARACTERISTICS					
Delay (V_{CC} = –30 V, I_C = 750 mA, I_{B1} = 15 mA)	t_d	–	100	–	ns
Rise (V_{CC} = –30 V, I_C = 750 mA, I_{B1} = 15 mA)	t_r	–	180	–	ns
Storage (V_{CC} = –30 V, I_C = 750 mA, I_{B1} = 15 mA)	t_s	–	540	–	ns
Fall (V_{CC} = –30 V, I_C = 750 mA, I_{B1} = 15 mA)	t_f	–	145	–	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. Pulsed Condition: Pulse Width = 300 msec, Duty Cycle ≤ 2%.
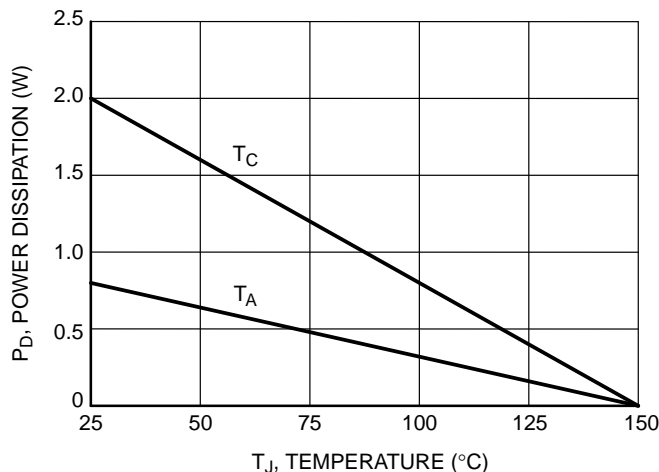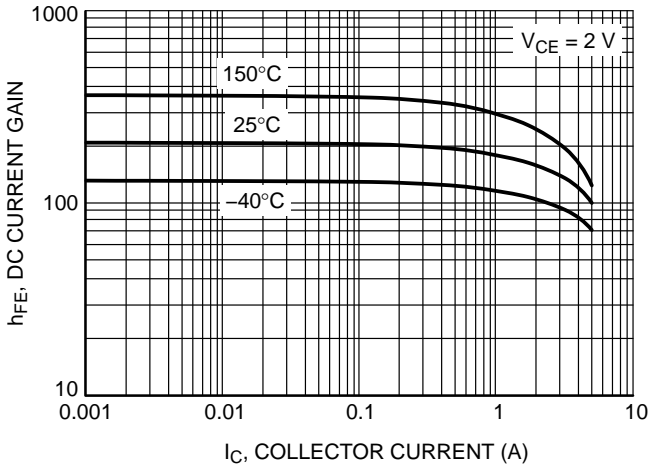

Figure 1. Power Derating
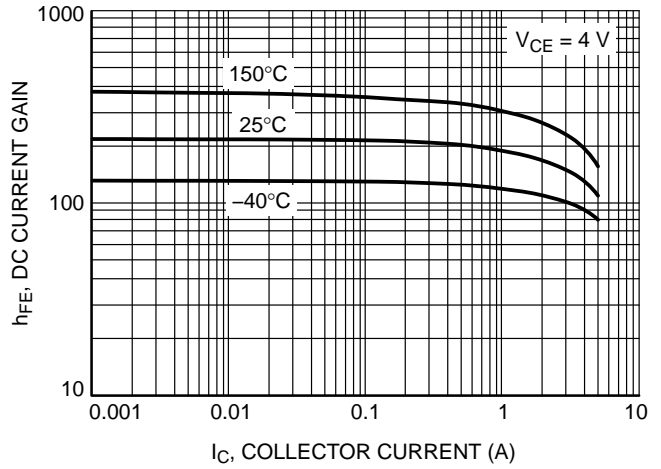
TYPICAL CHARACTERISTICS

Figure 2. DC Current Gain

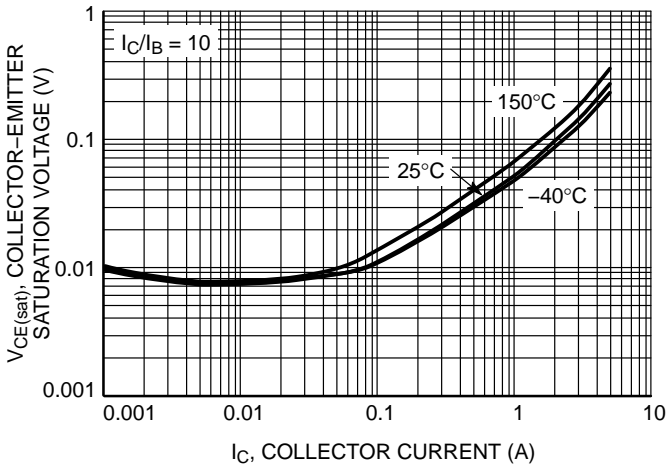**Figure 3. DC Current Gain**

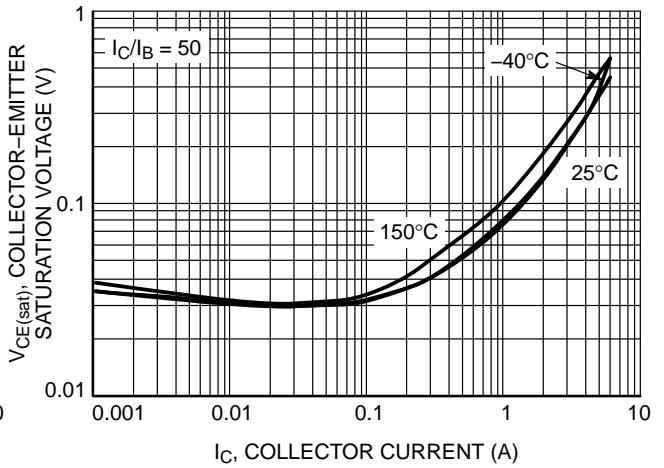**Figure 4. Collector−Emitter Saturation Voltage**

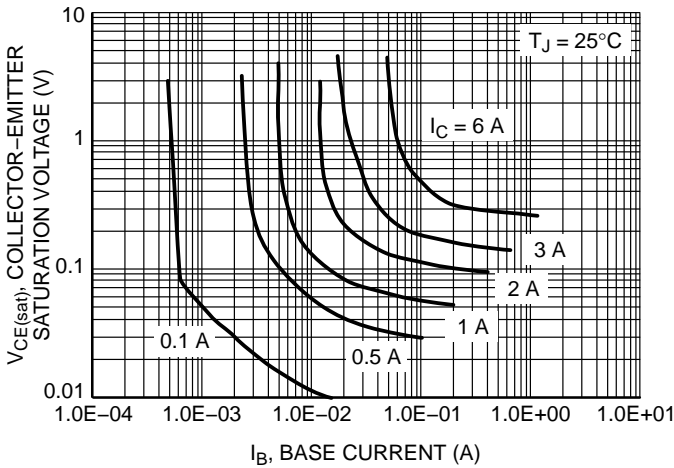**Figure 5. Collector−Emitter Saturation Voltage**
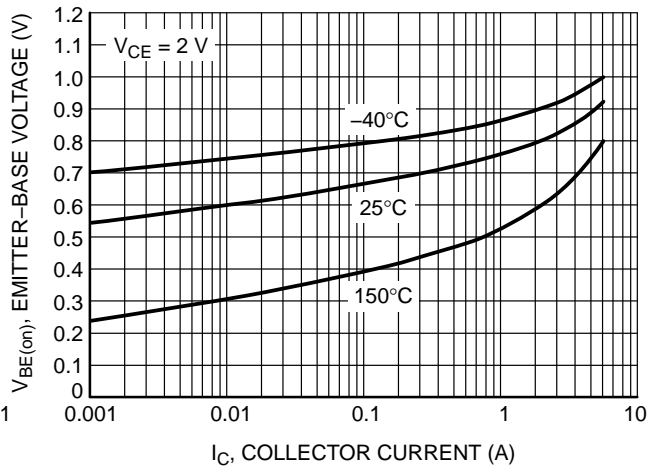

Figure 6. Collector Saturation Region

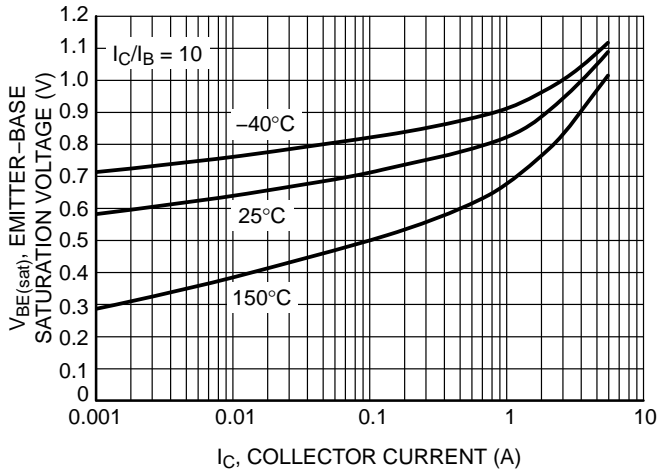**Figure 7. $V_{BE(on)}$ Voltage**

TYPICAL CHARACTERISTICS
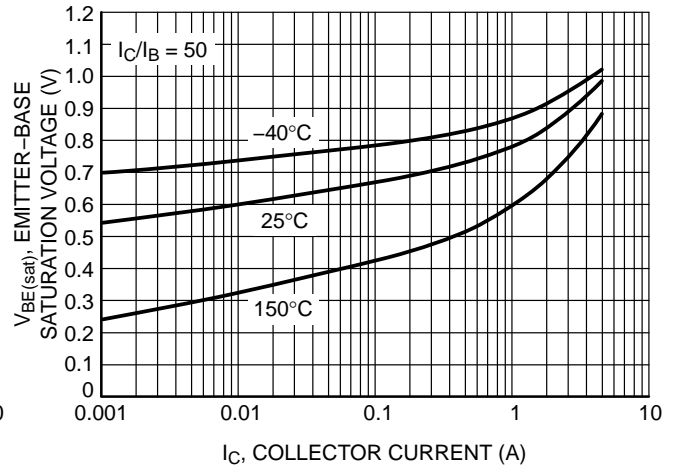

Figure 8. Base−Emitter Saturation Voltage
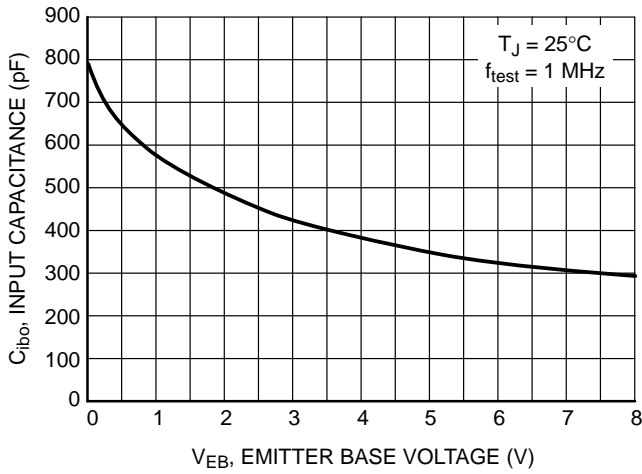

Figure 9. Base−Emitter Saturation Voltage

Figure 10. Input Capacitance
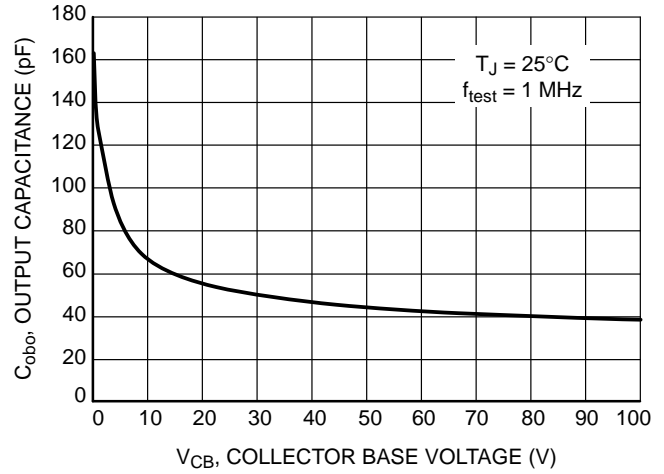
Figure 11. Output Capacitance
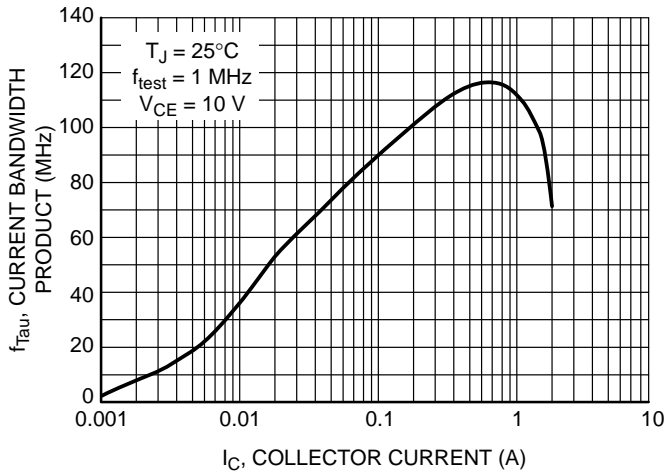
Figure 12. Current−Gain Bandwidth Product
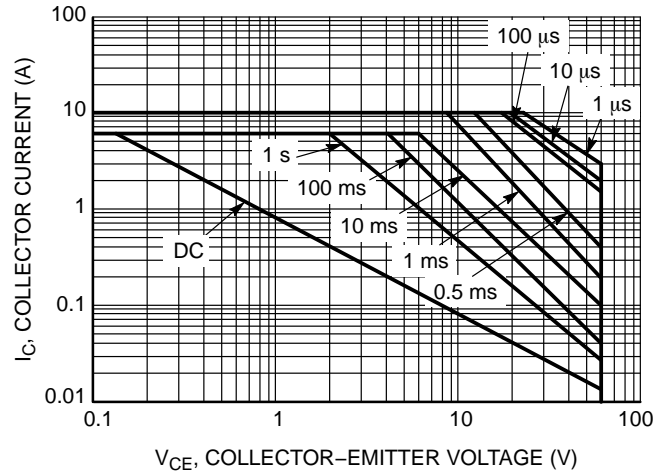
Figure 13. Safe Operating Area

SOT−223 (TO−261)
CASE 318E−04
ISSUE R

DATE 02 OCT 2018

SCALE 1:1

TOP VIEW

NOTE 5

$\oplus$ | 0.10 $\textcircled{M}$ | C | A | B

SIDE VIEW

SEE DETAIL A

FRONT VIEW

DETAIL A
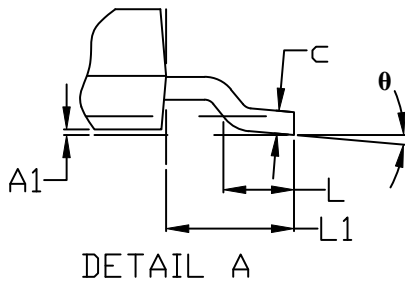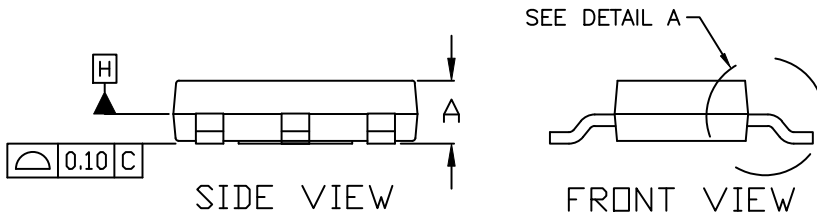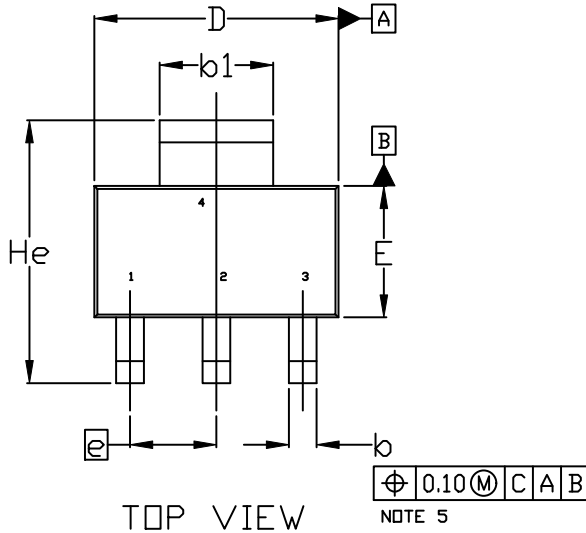
NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D & E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.200MM PER SIDE.
4. DATUMS A AND B ARE DETERMINED AT DATUM H.
5. A1 IS DEFINED AS THE VERTICAL DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT OF THE PACKAGE BODY.
6. POSITIONAL TOLERANCE APPLIES TO DIMENSIONS b AND b1.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	1.50	1.63	1.75
A1	0.02	0.06	0.10
b	0.60	0.75	0.89
b1	2.90	3.06	3.20
c	0.24	0.29	0.35
D	6.30	6.50	6.70
E	3.30	3.50	3.70
e	2.30 BSC		
L	0.20	---	---
L1	1.50	1.75	2.00
He	6.70	7.00	7.30
θ	0°	---	10°

3.80
2.00
6.30
3× 2.00
2.30 PITCH
3× 1.50

RECOMMENDED MOUNTING FOOTPRINT

DOCUMENT NUMBER:	98ASB42680B		
DESCRIPTION:	SOT−223 (TO−261)		**PAGE 1 OF 2**

SOT−223 (TO−261)
CASE 318E−04
ISSUE R

DATE 02 OCT 2018

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

STYLE 2:
PIN 1. ANODE
2. CATHODE
3. NC
4. CATHODE

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

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

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

STYLE 6:
PIN 1. RETURN
2. INPUT
3. OUTPUT
4. INPUT

STYLE 7:
PIN 1. ANODE 1
2. CATHODE
3. ANODE 2
4. CATHODE

STYLE 8:
CANCELLED

STYLE 9:
PIN 1. INPUT
2. GROUND
3. LOGIC
4. GROUND

STYLE 10:
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

STYLE 11:
PIN 1. MT 1
2. MT 2
3. GATE
4. MT 2

STYLE 12:
PIN 1. INPUT
2. OUTPUT
3. NC
4. OUTPUT

STYLE 13:
PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

**GENERIC
MARKING DIAGRAM***

AYW
XXXXX∎
.

1
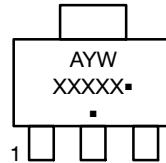
A = Assembly Location
Y = Year
W = Work Week
XXXXX = Specific Device Code
∎ = Pb−Free Package

(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.

DOCUMENT NUMBER:	98ASB42680B	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−223 (TO−261)		PAGE 2 OF 2

ADDITIONAL INFORMATION

◊