MOSFET – Power, Single, P-Channel, SOT-223

-60 V, -2.6 A

NTF2955, NVF2955

$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
−60 V	145 mΩ @ −10 V	−2.6 A

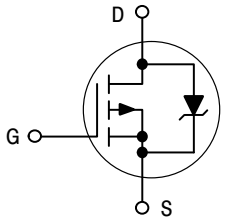
Features

- Design for low $R_{DS(on)}$
- Withstands High Energy in Avalanche and Commutation Modes
- AEC−Q101 Qualified − NVF2955
- These Devices are Pb−Free and are RoHS Compliant

Applications

- Power Supplies
- PWM Motor Control
- Converters
- Power Management

P−Channel



MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	−60	V
Gate−to−Source Voltage			V_{GS}	±20	V
Continuous Drain Current (Note 1)	Steady State	T_A = 25°C	I_D	−2.6	A
		T_A = 85°C		−2.0	
Power Dissipation (Note 1)	Steady State	T_A = 25°C	P_D	2.3	W
Continuous Drain Current (Note 2)	Steady State	T_A = 25°C	I_D	−1.7	A
		T_A = 85°C		−1.3	
Power Dissipation (Note 2)		T_A = 25°C	P_D	1.0	W
Pulsed Drain Current	tp = 10 μs		I_{DM}	−17	A
Operating Junction and Storage Temperature			T_J, T_{STG}	−55 to 175	°C
Single Pulse Drain−to−Source Avalanche Energy (V_{DD} = 25 V, V_G = 10 V, I_{PK} = 6.7 A, L = 10 mH, R_G = 25 Ω)			EAS	225	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 seconds)			T_L	260	°C

THERMAL RESISTANCE RATINGS

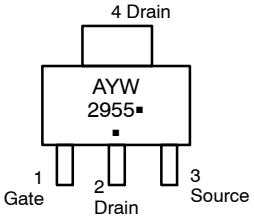
Parameter	Symbol	Max	Unit
Junction−to−Tab (Drain) − Steady State (Note 2)	$R_{\theta JC}$	14	°C/W
Junction−to−Ambient − Steady State (Note 1)	$R_{\theta JA}$	65	
Junction−to−Ambient − Steady State (Note 2)	$R_{\theta JA}$	150	

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. When surface mounted to an FR4 board using 1 in. pad size (Cu. area = 1.127 in^2 [1 oz] including traces)
2. When surface mounted to an FR4 board using the minimum recommended pad size (Cu. area = 0.341 in^2)

MARKING DIAGRAM AND PIN ASSIGNMENT

SOT−223
CASE 318E
STYLE 3



A = Assembly Location
Y = Year
W = Work Week
▪ = Pb−Free Package
(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
NTF2955T1G	SOT−223 (Pb−Free)	1000 /Tape & Reel
NVF2955T1G	SOT−223 (Pb−Free)	1000/ 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.

ELECTRICAL CHARACTERISTICS (T_J=25°C unless otherwise stated)

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = −250 μA		−60	–	–	V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			–	66.4	–	mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = −60 V	T_J = 25°C	–	–	−1.0	μA
			T_J = 125°C	–	–	−50	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V		–	–	±100	nA
ON CHARACTERISTICS (Note 3)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = −1.0 mA		−2.0	–	−4.0	V
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = −10 V, I_D = −0.75 A		–	145	170	mΩ
		V_{GS} = −10 V, I_D = −1.5 A		–	150	180	
		V_{GS} = −10 V, I_D = −2.4 A		–	154	185	
Forward Transconductance	g_{FS}	V_{GS} = −15 V, I_D = −0.75 A		–	1.77		S
CHARGES AND CAPACITANCES							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = 25 V		–	492	–	pF
Output Capacitance	C_{OSS}			–	165	–	
Reverse Transfer Capacitance	C_{RSS}			–	50	–	
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V, V_{DS} = 30 V, I_D = 1.5 A		–	14.3	–	nC
Threshold Gate Charge	$Q_{G(TH)}$			–	1.2	–	
Gate−to−Source Charge	Q_{GS}			–	2.3	–	
Gate−to−Drain Charge	Q_{GD}			–	5.2	–	
SWITCHING CHARACTERISTICS (Note 4)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 10 V, V_{DD} = 25 V, I_D = 1.5 A, R_G = 9.1 Ω R_L = 25 Ω		–	11	–	ns
Rise Time	t_r			–	7.6	–	
Turn−Off Delay Time	$t_{d(OFF)}$			–	65	–	
Fall Time	t_f			–	38	–	
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 1.5 A	T_J = 25°C	–	−1.10	−1.30	V
			T_J = 125°C	–	−0.9	–	
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dI_S/dt = 100 A/μs, I_S = 1.5 A		–	36	–	ns
Charge Time	t_a			–	20	–	
Discharge Time	t_b			–	16	–	
Reverse Recovery Charge	Q_{RR}			–	0.139	–	nC

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.

3. Pulse Test: pulse width ≤ 300μs, duty cycle ≤ 2%.
4. Switching characteristics are independent of operating junction temperatures.

TYPICAL PERFORMANCE CURVES (T_J = 25°C UNLESS OTHERWISE NOTED)

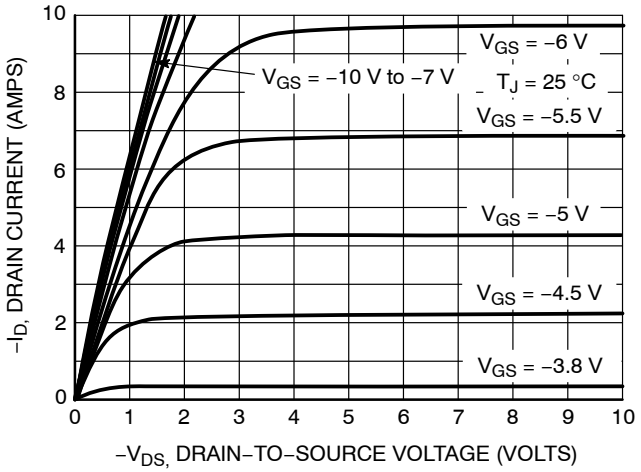


Figure 1. On−Region Characteristics

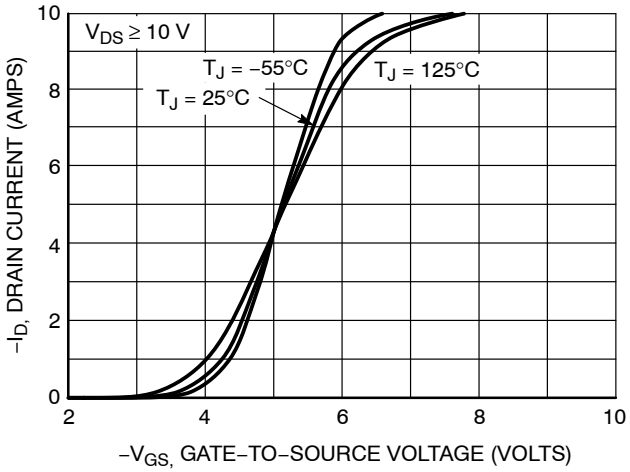


Figure 2. Transfer Characteristics

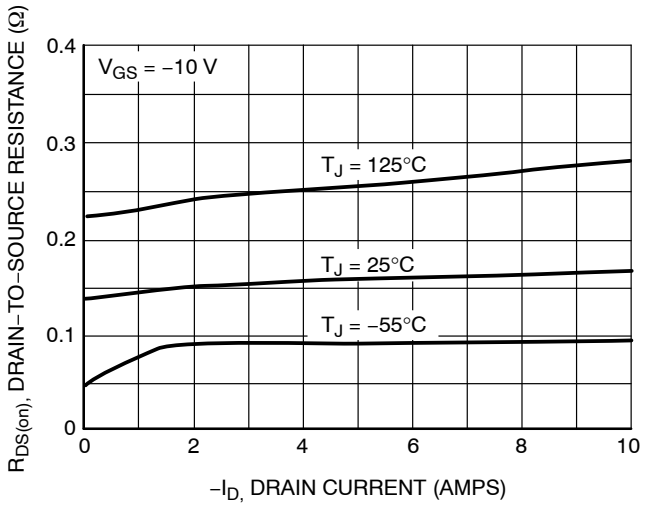


Figure 3. On−Resistance versus Drain Current and Temperature

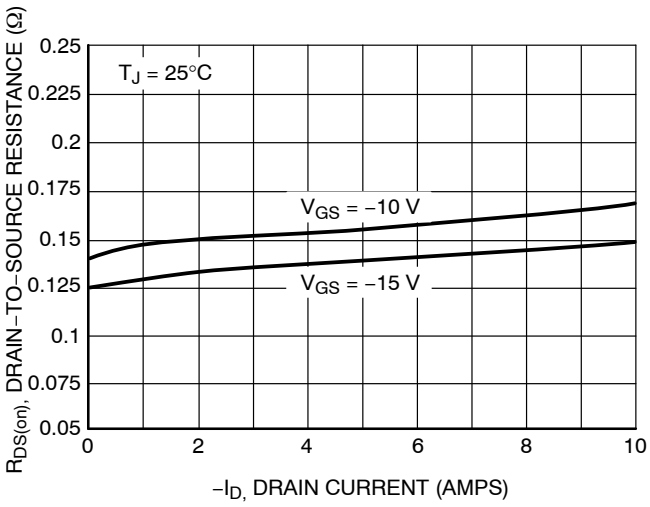


Figure 4. On−Resistance versus Drain Current and Gate Voltage

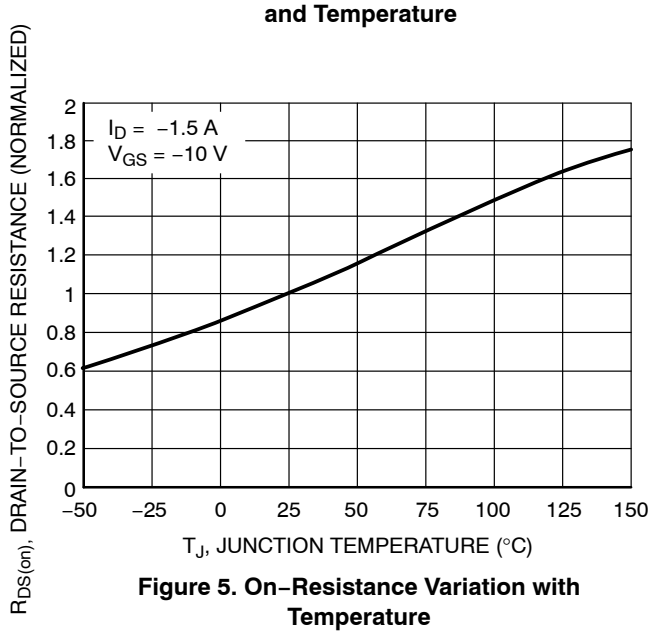


Figure 5. On−Resistance Variation with Temperature

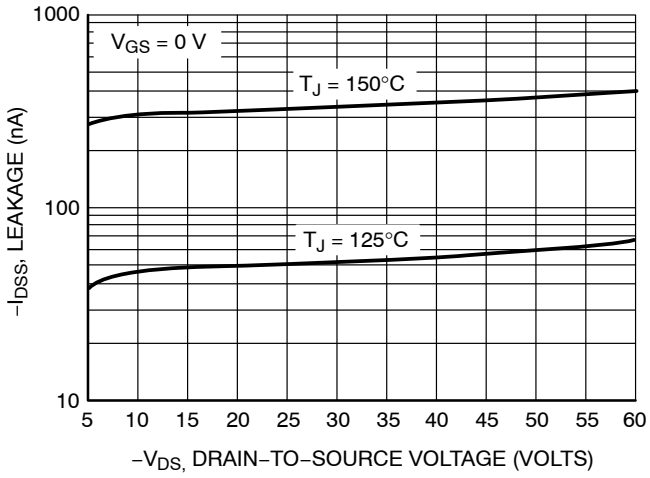


Figure 6. Drain−to−Source Leakage Current versus Voltage

TYPICAL PERFORMANCE CURVES (T_J = 25°C UNLESS OTHERWISE NOTED)

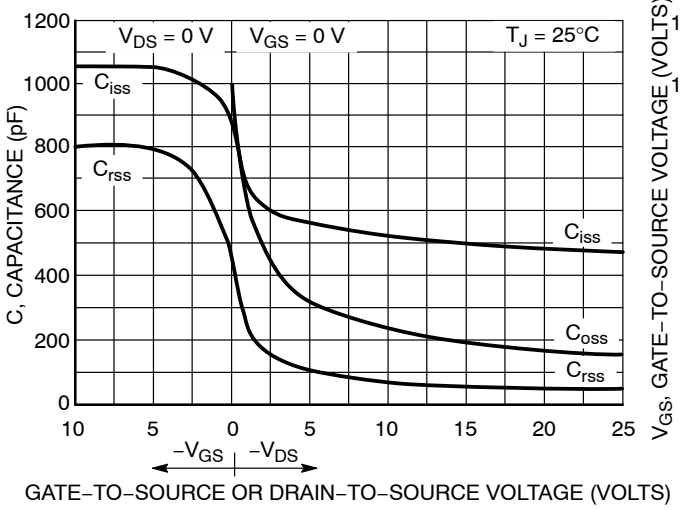


Figure 7. Capacitance Variation

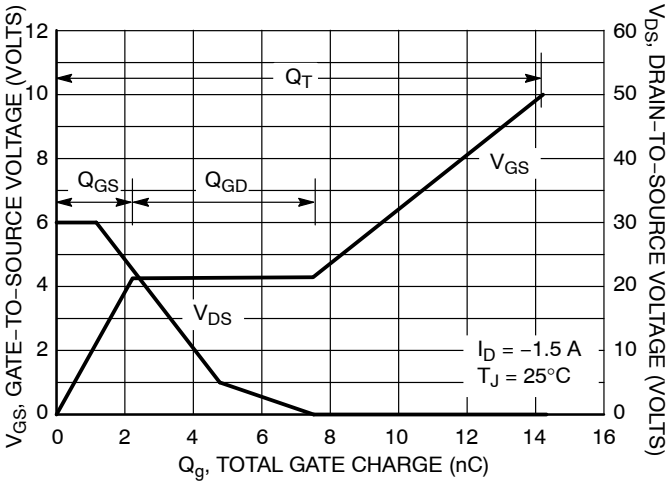


Figure 8. Gate−to−Source and Drain−to−Source Voltage versus Total Charge

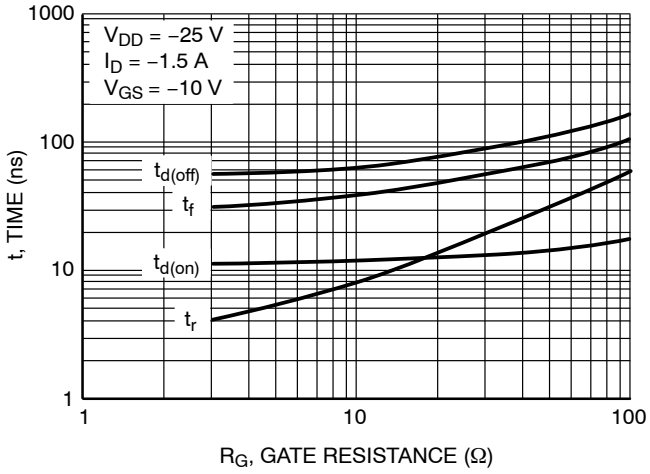


Figure 9. Resistive Switching Time Variation versus Gate Resistance

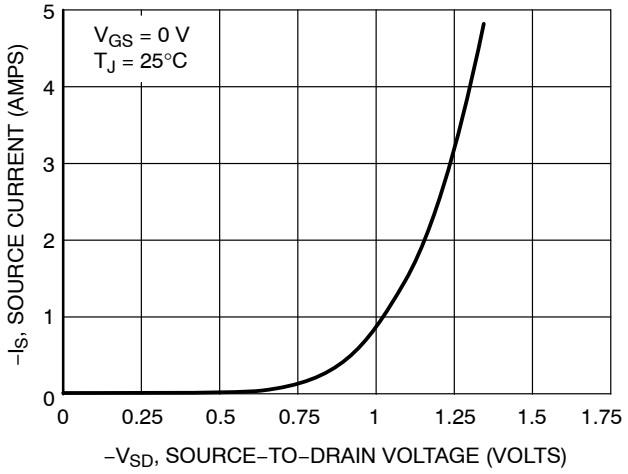


Figure 10. Diode Forward Voltage versus Current

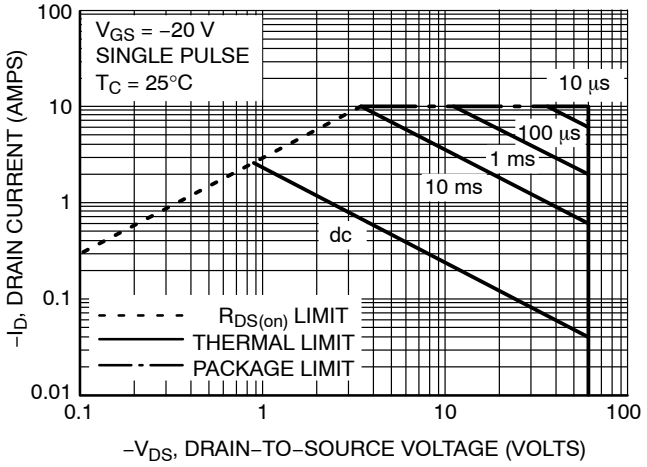


Figure 11. Maximum Rated Forward Biased Safe Operating Area

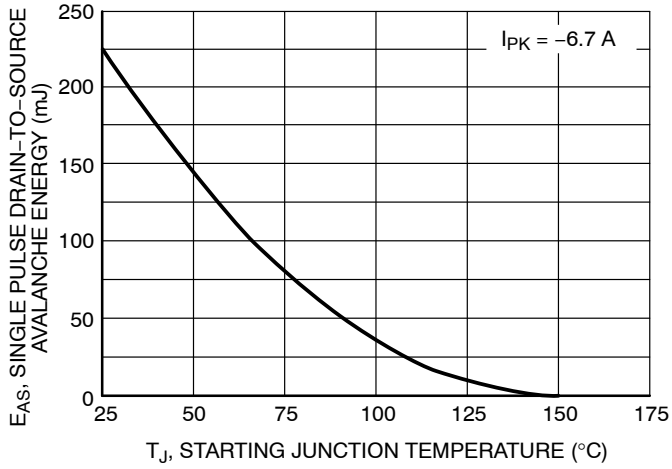


Figure 12. Maximum Avalanche Energy versus Starting Junction Temperature

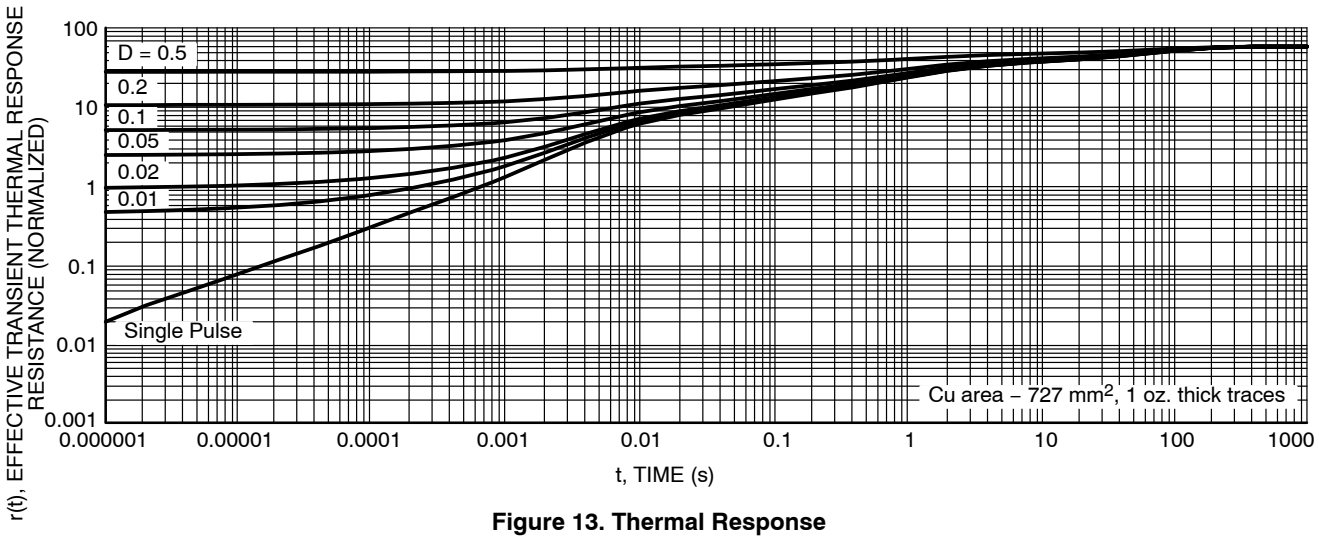
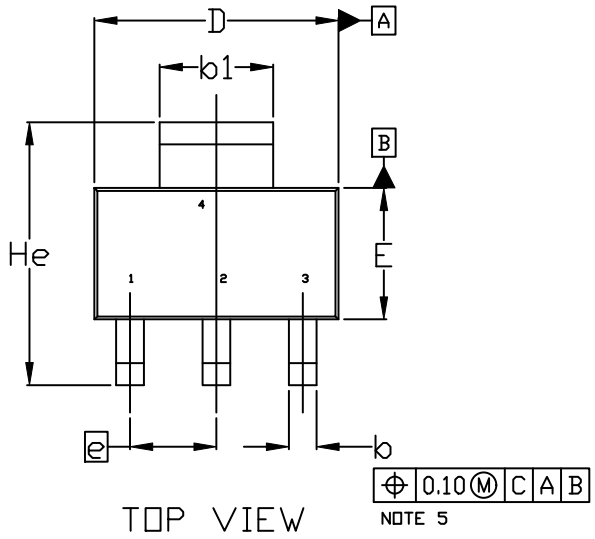


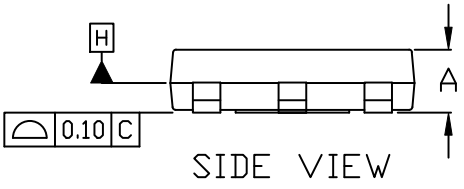
Figure 13. Thermal Response

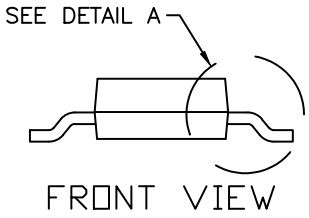
SCALE 1:1

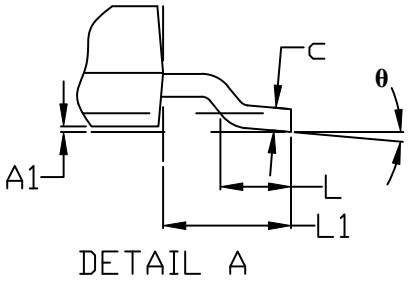
SOT−223 (TO−261)
CASE 318E−04
ISSUE R

DATE 02 OCT 2018



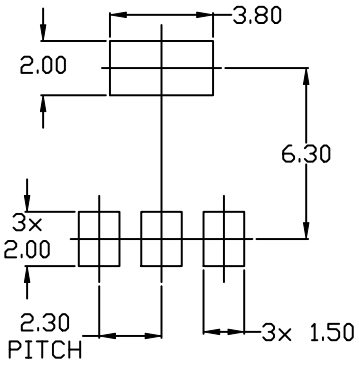






NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D & E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.200MM PER SIDE.
4. DATUMS A AND B ARE DETERMINED AT DATUM H.
5. A1 IS 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.

	MILLIMETERS		
DIM	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°



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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

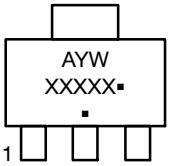
STYLE 10:
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

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*



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.

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