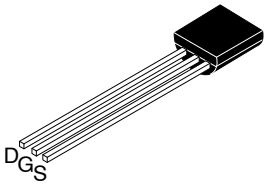
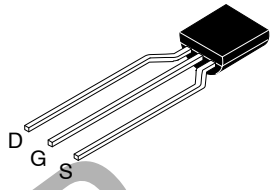
Field Effect Transistor - N-Channel, Enhancement Mode

BS270



TO-92 3 4.825x4.76
CASE 135AN



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CASE 135AR

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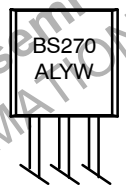
General Description

These N-Channel enhancement mode field effect transistors are produced using **onsemi**'s proprietary, high cell density, DMOS technology. These products have been designed to minimize on-state resistance while provide rugged, reliable, and fast switching performance. They can be used in most applications requiring up to 500 mA DC. These products are particularly suited for low voltage, low current applications such as small servo motor control, power MOSFET gate drivers, and other switching applications.

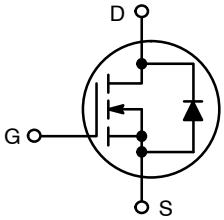
Features

- 400 mA, 60 V. $R_{DS(ON)}$ = 2 Ω @ V_{GS} = 10 V
- High Density Cell Design for Low $R_{DS(ON)}$
- Voltage Controlled Small Signal Switch
- Rugged and Reliable
- High Saturation Current Capability
- These are Pb-Free Devices

MARKING DIAGRAM



BS270 = Device Code
A = Assembly Site
L = Wafer Lot Number
YW = Assembly Start Week



ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-Source Voltage	60	V
V_{DGR}	Drain-Gate Voltage ($R_{GS} \le 1$ MΩ)	60	V
V_{GSS}	Gate-Source Voltage – Continuous – Non Repetitive (tp < 50 μs)	 ±20 ±40	V
I_D	Drain Current – Continuous – Pulsed	 400 2000	mA
P_D	Maximum Power Dissipation Derate above 25 °C	625 5	mW mW/°C
T_J, T_{STG}	Operating and Storage Temperature Range	– 55 to 150	°C
T_L	Maximum Lead Temperature for Soldering Purposes, 1/16" from Case for 10 Seconds	300	°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.

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	200	°C/W

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

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 10 μA	60	–	–	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 60 V, V_{GS} = 0 V	–	–	1	μA
		V_{DS} = 60 V, V_{GS} = 0 V, T_J = 125 °C	–	–	500	μA
I_{GSSF}	Gate – Body Leakage, Forward	V_{GS} = 20 V, V_{DS} = 0 V	–	–	10	nA
	Gate – Body Leakage, Reverse	V_{GS} = –20 V, V_{DS} = 0 V	–	–	–10	nA
ON CHARACTERISTICS (Note 1)						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA	1	2.1	2.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 500 mA	–	1.2	2	Ω
		V_{GS} = 10 V, I_D = 500 mA, T_J = 125 °C	–	2	3.5	
		V_{GS} = 4.5 V, I_D = 75 mA	–	1.8	3	
$V_{DS(ON)}$	Drain-Source On-Voltage	V_{GS} = 10 V, I_D = 500 mA	–	0.6	1	V
		V_{GS} = 4.5 V, I_D = 75 mA	–	0.14	0.225	
$I_{D(ON)}$	On-State Drain Current	V_{GS} = 10 V, V_{DS} ≥ 2 $V_{DS(on)}$	2000	2700	–	mA
		V_{GS} = 4.5 V, V_{DS} ≥ 2 $V_{DS(on)}$	400	600	–	
g_{FS}	Forward Transconductance	V_{DS} ≥ 2 $V_{DS(on)}$, I_D = 200 mA	100	320	–	mS
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	–	20	50	pF
C_{oss}	Output Capacitance		–	11	25	pF
C_{rss}	Reverse Transfer Capacitance		–	4	5	pF
SWITCHING CHARACTERISTICS (Note 1)						
t_{on}	Turn-On Time	V_{DD} = 30 V, I_D = 500 mA, V_{GS} = 10 V, R_{GEN} = 25 Ω	–	–	10	ns
t_{off}	Turn-Off Time		–	–	10	ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
I_S	Maximum Continuous Drain-Source Diode Forward Current		–	–	400	mA
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		–	–	2000	mA
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 400 mA (Note 1)	–	0.88	1.2	V

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. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

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TYPICAL ELECTRICAL CHARACTERISTICS

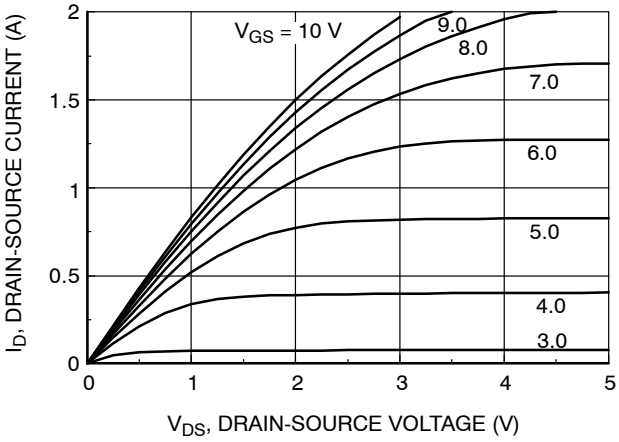

Figure 1. On-Region Characteristics

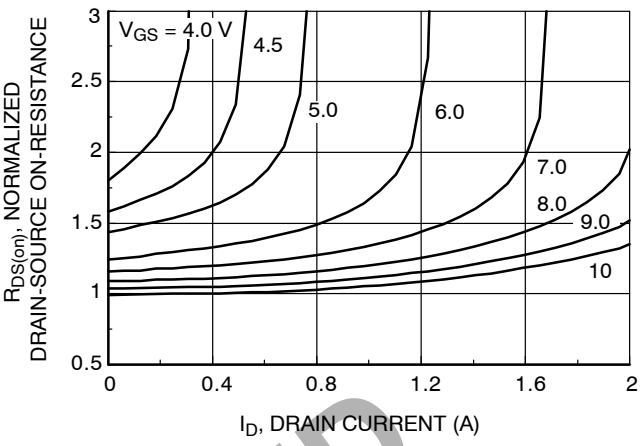

Figure 2. On-Resistance Variation with Gate Voltage and Drain Current

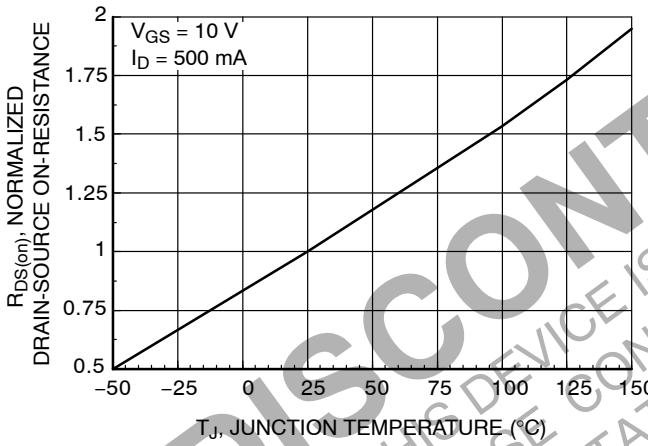

Figure 3. On-Resistance Variation with Temperature

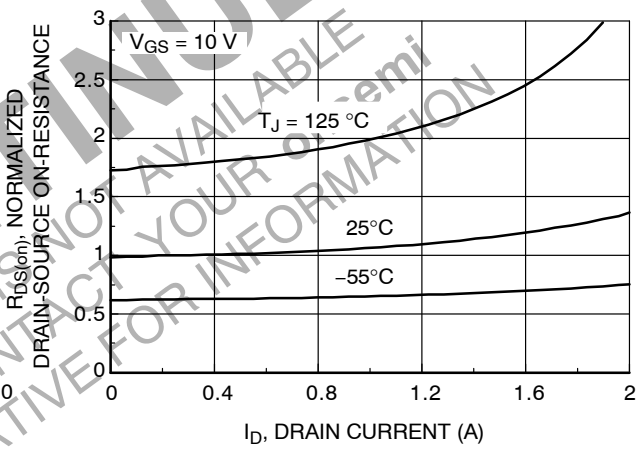

Figure 4. On-Resistance Variation with Drain Current and Temperature

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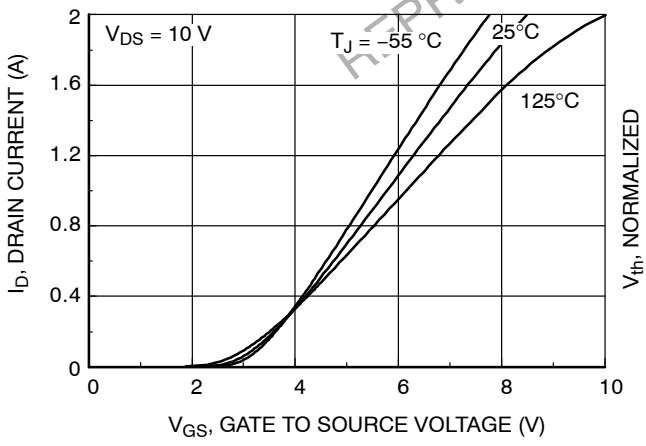

Figure 5. Transfer Characteristics

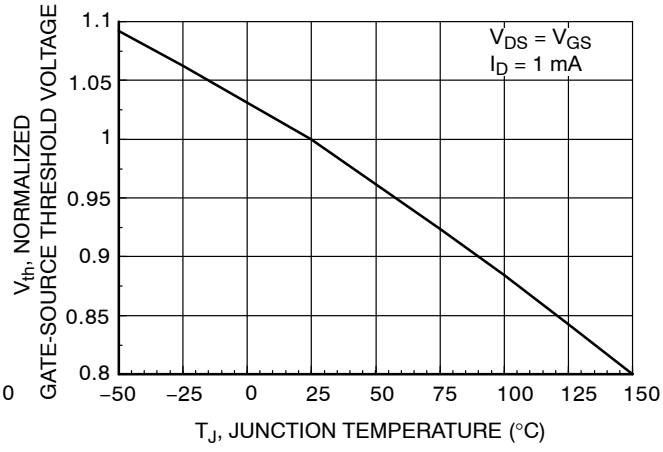

Figure 6. Gate Threshold Variation with Temperature

TYPICAL ELECTRICAL CHARACTERISTICS (continued)

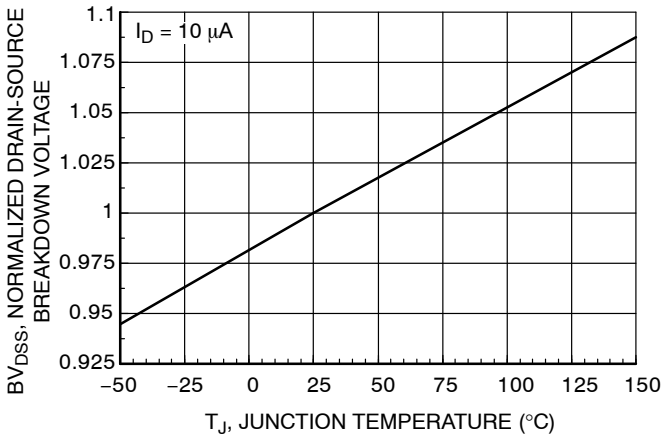

Figure 7. Breakdown Voltage Variation with Temperature

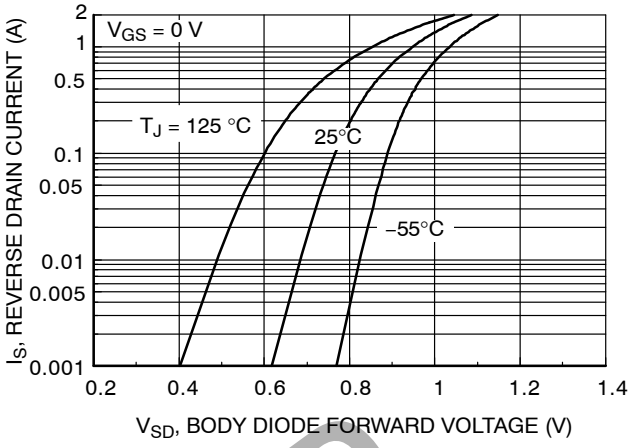

Figure 8. Body Diode Forward Voltage Variation with Current and Temperature

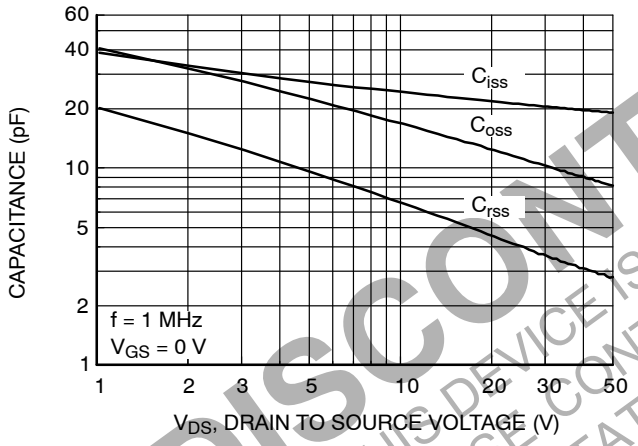

Figure 9. Capacitance Characteristics

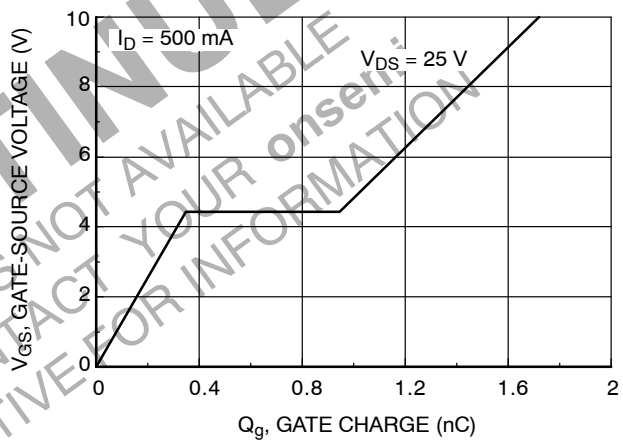

Figure 10. Gate Charge Characteristics

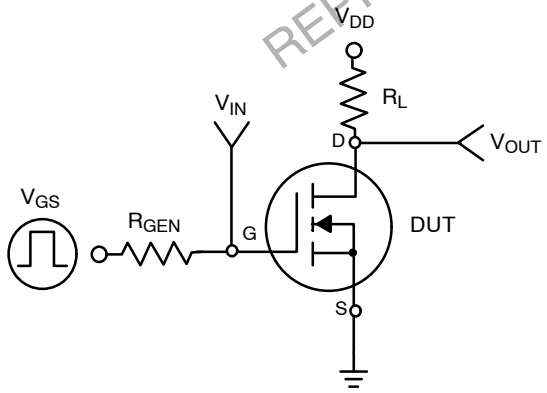

Figure 11. Switching Test Circuit

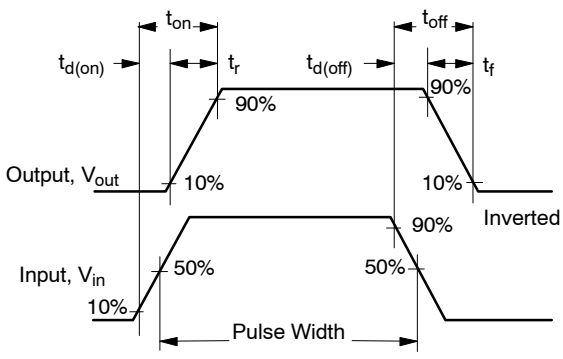

Figure 12. Switching Waveforms

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TYPICAL ELECTRICAL CHARACTERISTICS (continued)

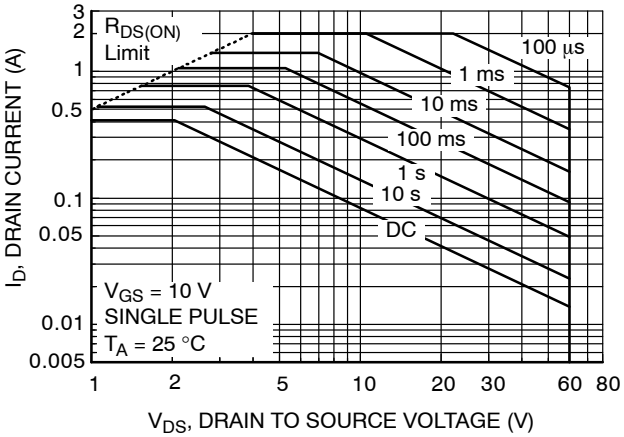

Figure 13. Maximum Safe Operating Area

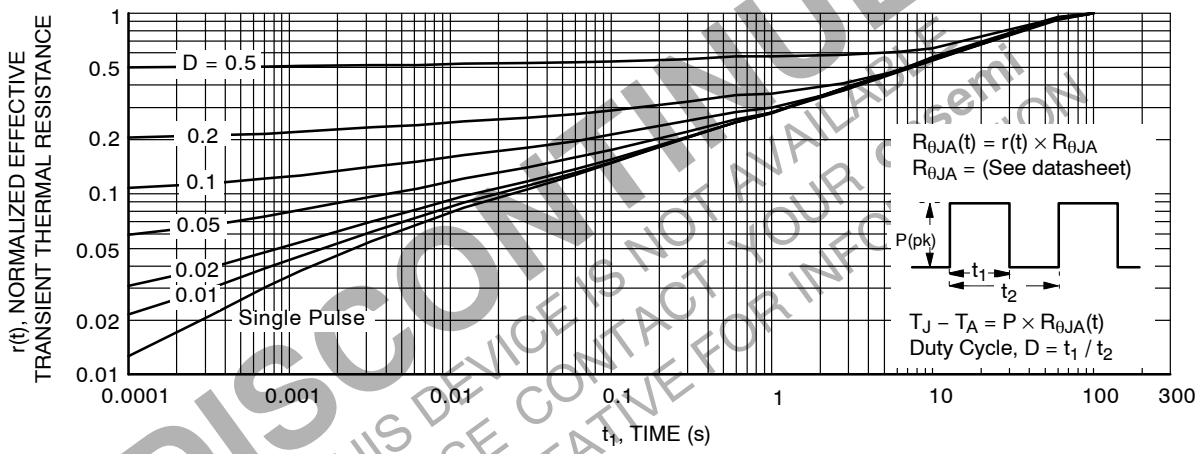

Figure 14. Transient Thermal Response Curve

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ORDERING INFORMATION

Part Number	Package	Shipping
BS270	TO-92, Case 135AN (Pb-Free)	10000 Units / Bulk
BS270-D74Z	TO-92, Case 135AR (Pb-Free)	2000 Units / Fan-Fold

REVISION HISTORY

Revision	Description of Changes	Date
4	Data Sheet Discontinued.	2/11/2025

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.

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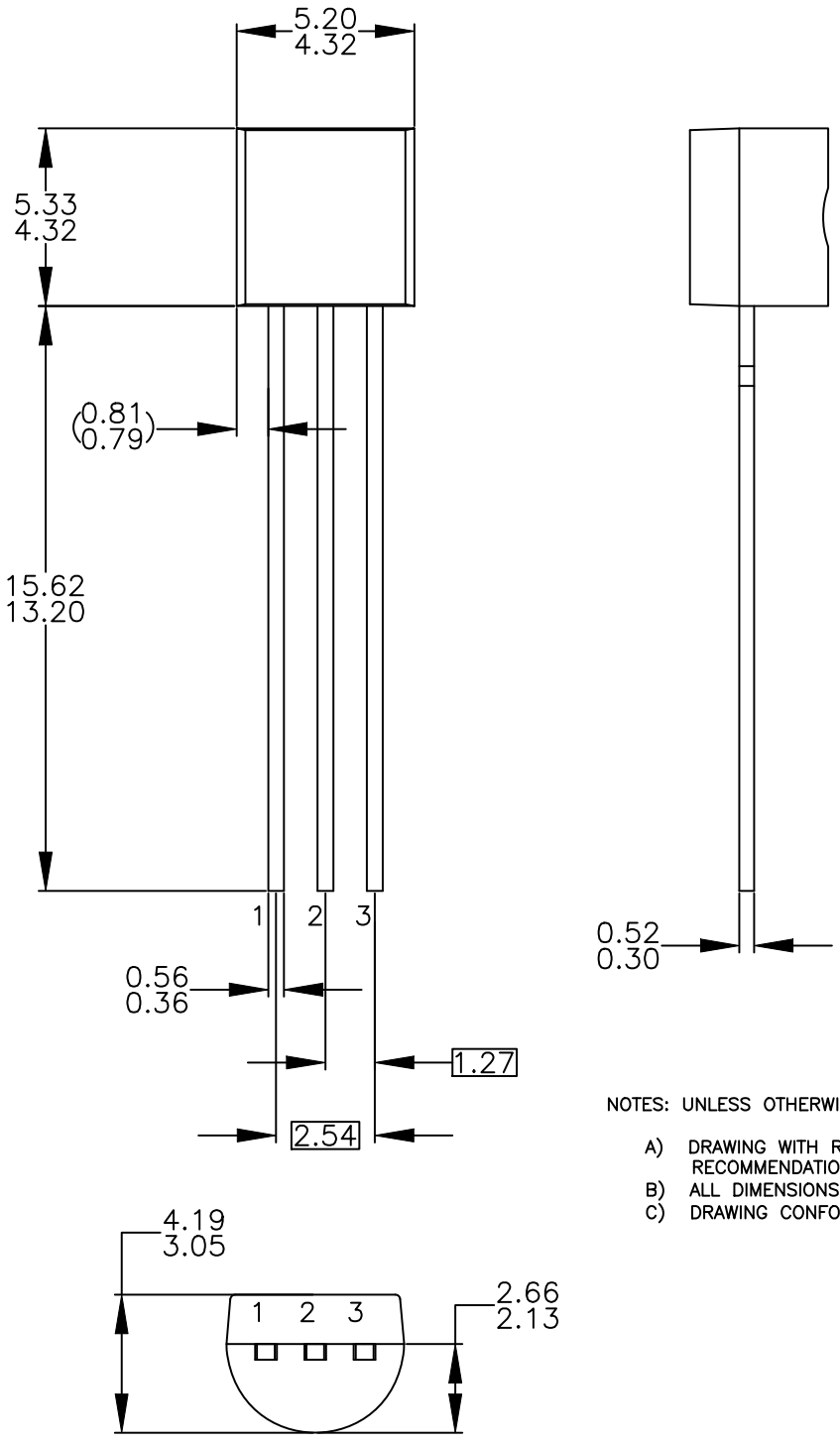

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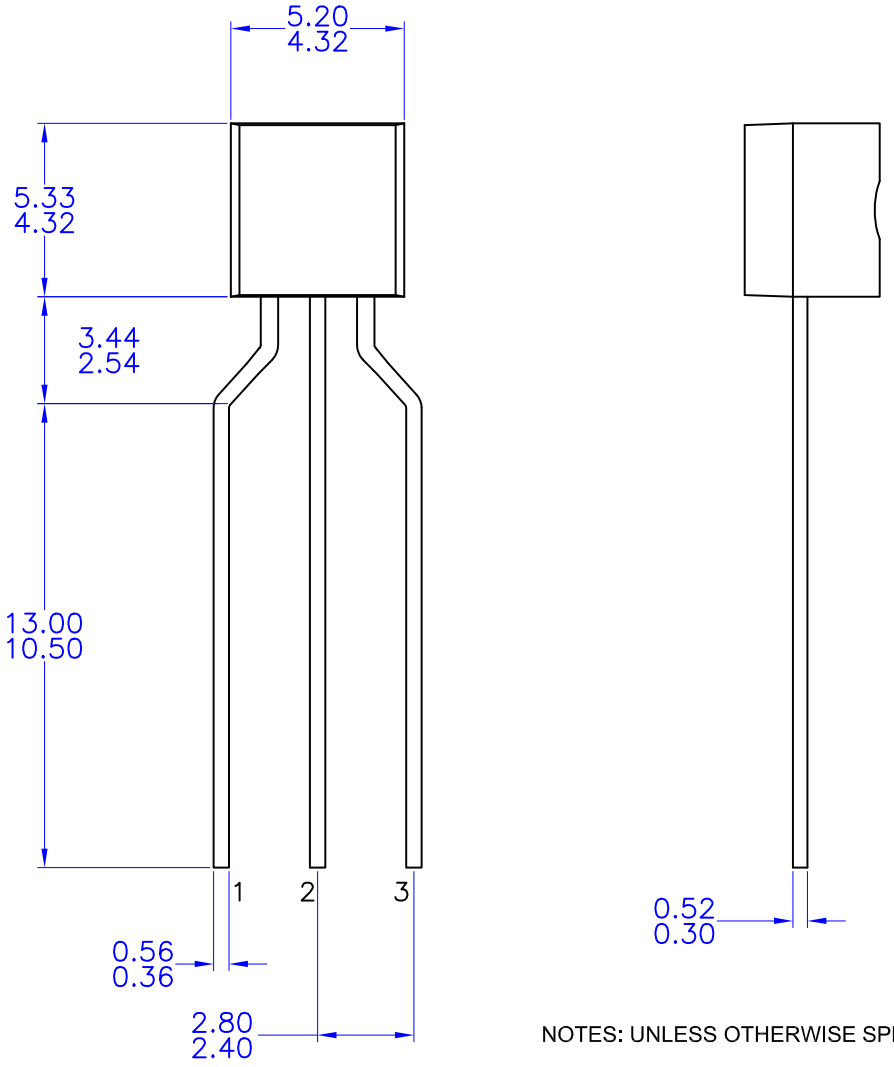
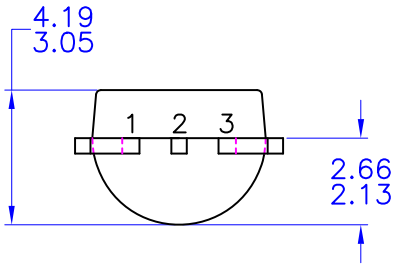
ISSUE O

DATE 30 SEP 2016





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