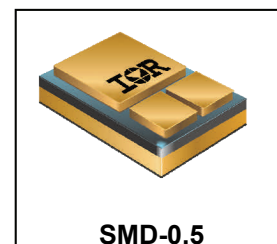


HEXFET® POWER MOSFET SURFACE MOUNT (SMD-0.5)

150V, P-CHANNEL

Product Summary

Part Number	BV_{DSS}	$R_{DS(on)}$	I_D
IRF5NJ6215	-150V	0.29 Ω	-11A



SMD-0.5

Description

Fifth Generation HEXFET® power MOSFETs from IR HiRel utilize advanced processing techniques to achieve the lowest possible on-resistance per silicon unit area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET power MOSFETs are well known for, provides the designer with an extremely efficient device for use in a wide variety of applications.

These devices are well-suited for applications such as switching power supplies, motor controls, inverters, choppers, audio amplifiers and high-energy pulse circuits.

Features

- Low $R_{DS(on)}$
- Avalanche Energy Ratings
- Dynamic dv/dt Rating
- Simple Drive Requirements
- Hermetically Sealed
- Surface Mount
- Light Weight

Absolute Maximum Ratings

Pre-Irradiation

Symbol	Parameter	Value	Units
$I_{D1} @ V_{GS} = -10V, T_C = 25^\circ C$	Continuous Drain Current	-11	A
$I_{D2} @ V_{GS} = -10V, T_C = 100^\circ C$	Continuous Drain Current	-7.2	
$I_{DM} @ T_C = 25^\circ C$	Pulsed Drain Current ①	-44	
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	75	W
	Linear Derating Factor	0.6	W/ $^\circ C$
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy ②	130	mJ
I_{AR}	Avalanche Current ①	-11	A
E_{AR}	Repetitive Avalanche Energy ①	7.5	mJ
dv/dt	Peak Diode Recovery dv/dt ③	10	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	$^\circ C$
	Package Mounting Surface Temp	300 (for 5s)	
	Weight	1.0 (Typical)	g

For Footnotes, refer to the page 2.

Electrical Characteristics @ T_J = 25°C (Unless Otherwise Specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV _{DSS}	Drain-to-Source Breakdown Voltage	-150	—	—	V	V _{GS} = 0V, I _D = -250μA
ΔBV _{DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient	—	-0.17	—	V/°C	Reference to 25°C, I _D = -1.0mA
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	—	0.29	Ω	V _{GS} = -10V, I _{D2} = -7.2A ④
V _{GS(th)}	Gate Threshold Voltage	-2.0	—	-4.0	V	V _{DS} = V _{GS} , I _D = -250μA
g _{fs}	Forward Transconductance	2.3	—	—	S	V _{DS} = -25V, I _{D2} = -7.2A ④
I _{DSS}	Zero Gate Voltage Drain Current	—	—	-25	μA	V _{DS} = -120V, V _{GS} = 0V
		—	—	-250		V _{DS} = -120V, V _{GS} = 0V, T _J = 125°C
I _{GSS}	Gate-to-Source Leakage Forward	—	—	-100	nA	V _{GS} = -20V
	Gate-to-Source Leakage Reverse	—	—	100		V _{GS} = 20V
Q _G	Total Gate Charge	—	—	66		I _{D2} = -7.2A
Q _{GS}	Gate-to-Source Charge	—	—	13	nC	V _{DS} = -120V
Q _{GD}	Gate-to-Drain ('Miller') Charge	—	—	40		V _{GS} = -10V
t _{d(on)}	Turn-On Delay Time	—	—	25	ns	V _{DD} = -75V
t _r	Rise Time	—	—	65		I _{D2} = -7.2A
t _{d(off)}	Turn-Off Delay Time	—	—	75		R _G = 6.8Ω
t _f	Fall Time	—	—	53		V _{GS} = -10V
L _S + L _D	Total Inductance	—	4.0	—	nH	Measured from center of Drain pad to center of Source pad
C _{iss}	Input Capacitance	—	990	—	pF	V _{GS} = 0V
C _{oss}	Output Capacitance	—	230	—		V _{DS} = -25V
C _{rss}	Reverse Transfer Capacitance	—	120	—		f = 1.0MHz

Source-Drain Diode Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I _S	Continuous Source Current (Body Diode)	—	—	-11	A	
I _{SM}	Pulsed Source Current (Body Diode) ①	—	—	-44		
V _{SD}	Diode Forward Voltage	—	—	-1.6	V	T _J = 25°C, I _S = -7.2A, V _{GS} = 0V ④
t _{rr}	Reverse Recovery Time	—	—	240	ns	T _J = 25°C, I _F = -7.2A, V _{DD} ≤ -25V
Q _{rr}	Reverse Recovery Charge	—	—	1.7	μC	di/dt = -100A/μs ④
t _{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L _S + L _D)				

Thermal Resistance

Symbol	Parameter	Min.	Typ.	Max.	Units
R _{θJC}	Junction-to-Case	—	—	1.67	°C/W

Footnotes:

- ① Repetitive Rating; Pulse width limited by maximum junction temperature.
- ② V_{DD} = -50V, starting T_J = 25°C, L = 5.0mH, Peak I_L = -7.2A, V_{GS} = -10V, R_G = 25Ω
- ③ I_{SD} ≤ -7.2A, di/dt ≤ -390A/μs, V_{DD} ≤ -150V, T_J ≤ 150°C
- ④ Pulse width ≤ 300 μs; Duty Cycle ≤ 2%

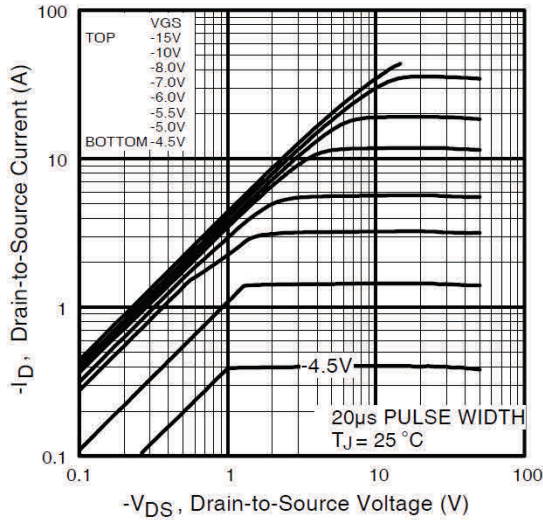


Fig 1. Typical Output Characteristics

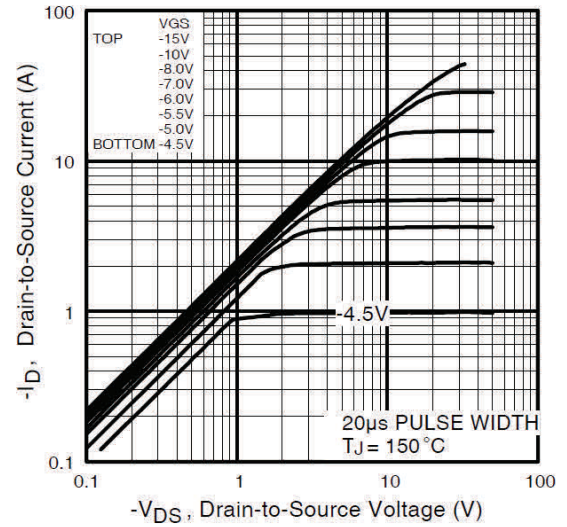


Fig 2. Typical Output Characteristics

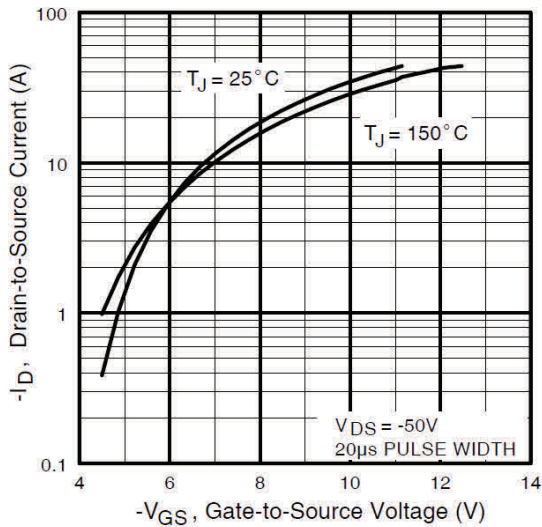


Fig 3. Typical Transfer Characteristics

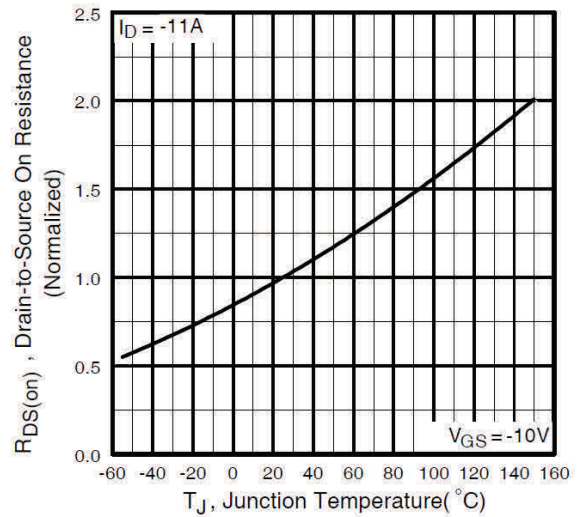


Fig 4. Normalized On-Resistance Vs. Temperature

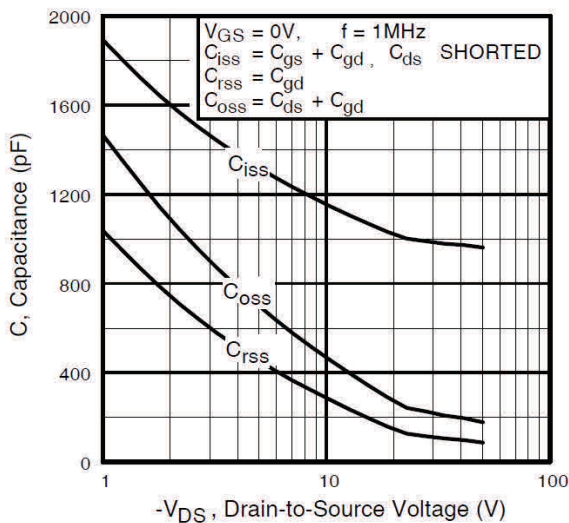


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

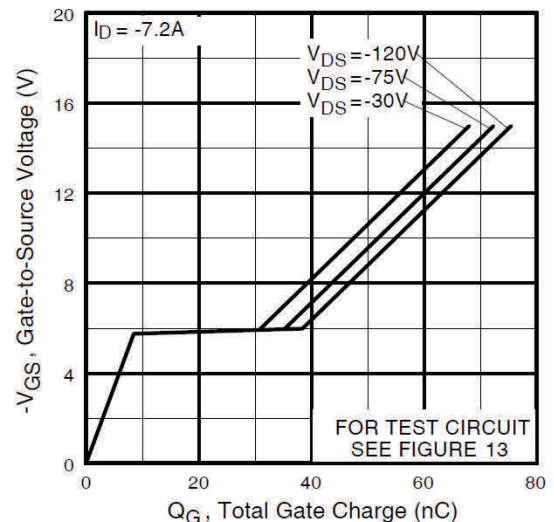


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

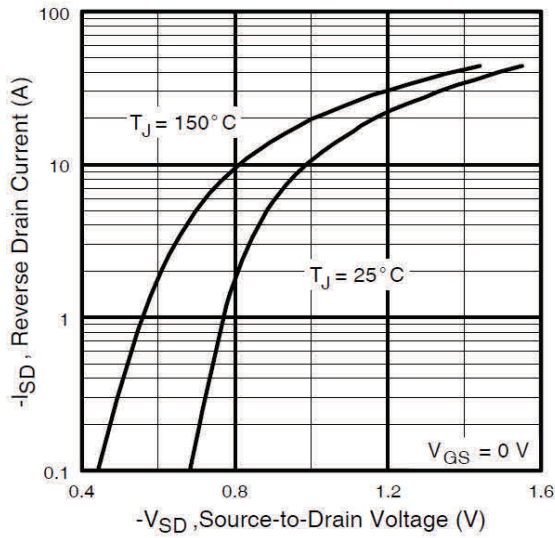


Fig 7. Typical Source-Drain Diode Forward Voltage

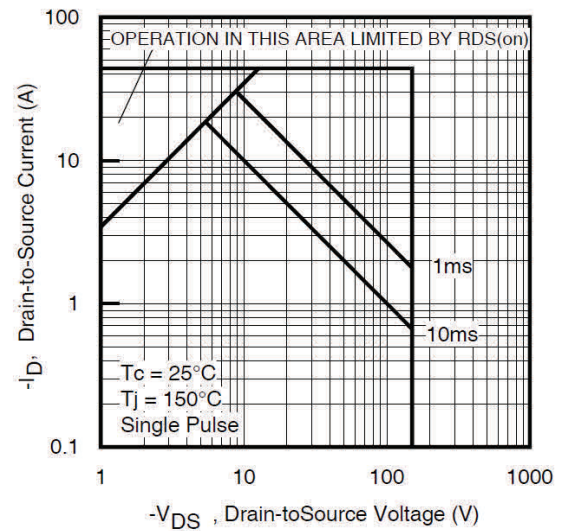


Fig 8. Maximum Safe Operating Area

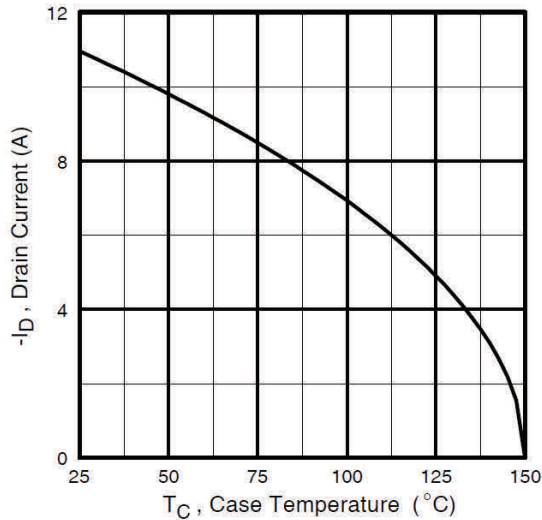


Fig 9. Maximum Drain Current Vs. Case Temperature

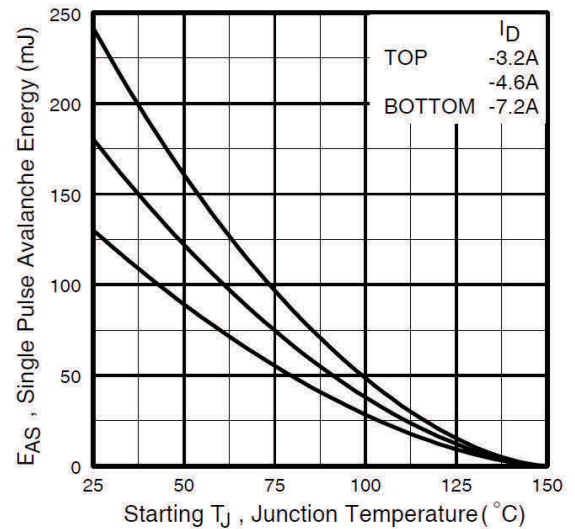


Fig 10. Maximum Avalanche Energy Vs. Drain Current

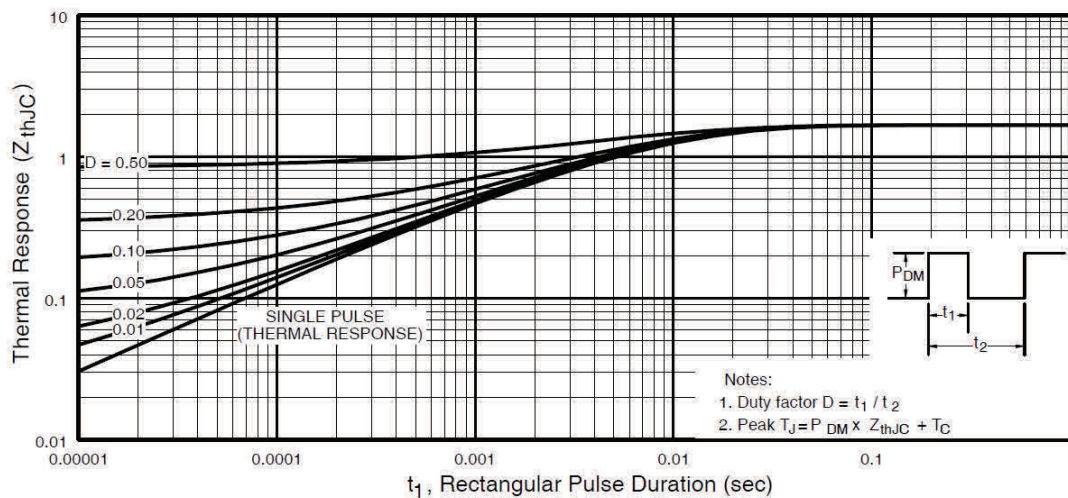


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

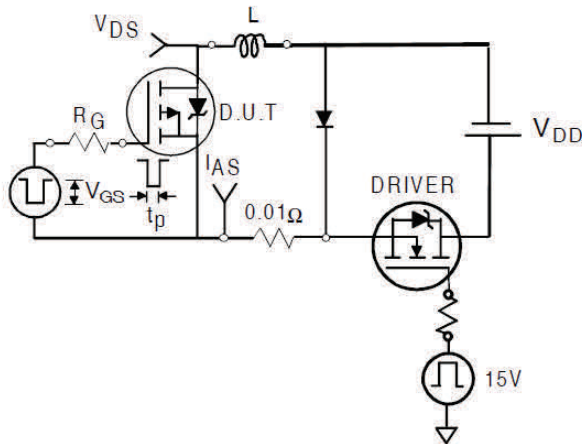


Fig 12a. Unclamped Inductive Test Circuit

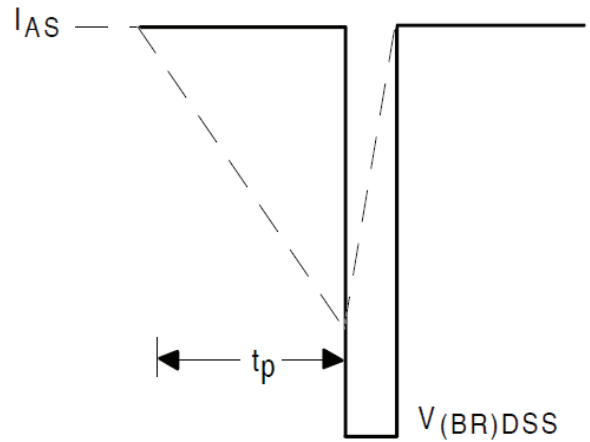


Fig 12b. Unclamped Inductive Waveforms

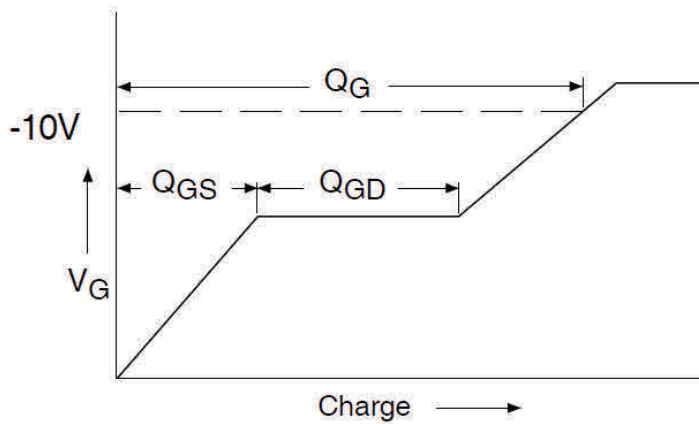


Fig 13a. Gate Charge Waveform

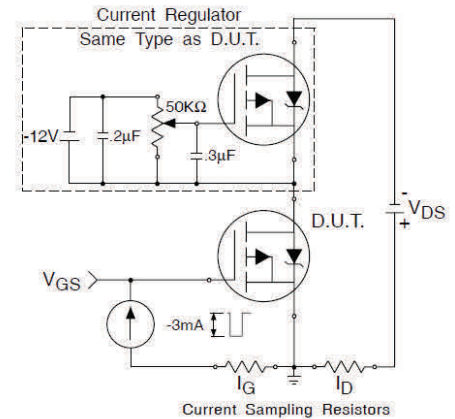


Fig 13b. Gate Charge Test Circuit

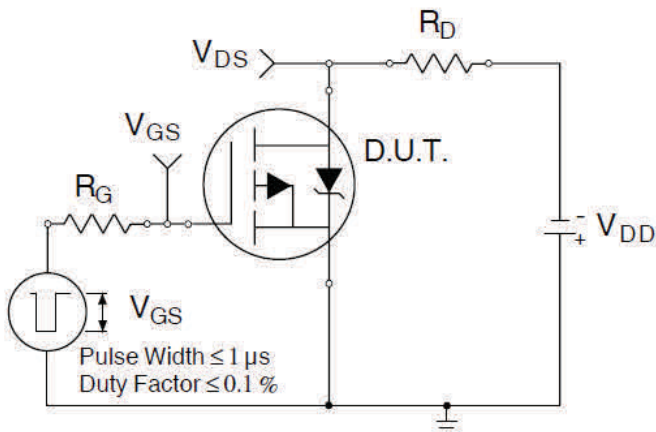


Fig 14a. Switching Time Test Circuit

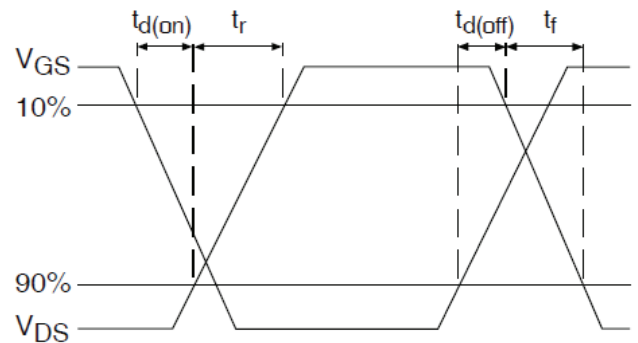


Fig 14b. Switching Time Waveforms

Technical drawing of a mechanical part showing three views: front, side, and top. The drawing includes dimensions in inches and millimeters, feature control frames, and datum labels A, B, and C.

Front View Dimensions:

- Overall width: 7.64 [.301] / 7.40 [.291]
- Overall height: 10.28 [.405] / 10.04 [.395]
- Feature 1 (Top): 3.12 [.123] MAX.
- Feature 2 (Bottom Left): 1.65 [.065]
- Feature 3 (Bottom Right): 1.91 [.075]
- Feature 4 (Bottom Right): 3.81 [.150]
- Feature 5 (Bottom Right): 3.17 [.125] / 2.93 [.115]
- Feature 6 (Bottom Right): 2.54 [.100] / 2.29 [.090]
- Feature 7 (Bottom Right): 5.84 [.230] / 5.59 [.220]
- Feature 8 (Bottom Right): 5.52 [.218]
- Feature 9 (Bottom Right): 5.24 [.210]
- Feature 10 (Bottom Right): 5.14 [.201]
- Feature 11 (Bottom Right): 5.04 [.195]
- Feature 12 (Bottom Right): 4.94 [.189]
- Feature 13 (Bottom Right): 4.84 [.183]
- Feature 14 (Bottom Right): 4.74 [.177]
- Feature 15 (Bottom Right): 4.64 [.171]
- Feature 16 (Bottom Right): 4.54 [.165]
- Feature 17 (Bottom Right): 4.44 [.159]
- Feature 18 (Bottom Right): 4.34 [.153]
- Feature 19 (Bottom Right): 4.24 [.147]
- Feature 20 (Bottom Right): 4.14 [.141]
- Feature 21 (Bottom Right): 4.04 [.135]
- Feature 22 (Bottom Right): 3.94 [.129]
- Feature 23 (Bottom Right): 3.84 [.123]
- Feature 24 (Bottom Right): 3.74 [.117]
- Feature 25 (Bottom Right): 3.64 [.111]
- Feature 26 (Bottom Right): 3.54 [.105]
- Feature 27 (Bottom Right): 3.44 [.099]
- Feature 28 (Bottom Right): 3.34 [.093]
- Feature 29 (Bottom Right): 3.24 [.087]
- Feature 30 (Bottom Right): 3.14 [.081]
- Feature 31 (Bottom Right): 3.04 [.075]
- Feature 32 (Bottom Right): 2.94 [.069]
- Feature 33 (Bottom Right): 2.84 [.063]
- Feature 34 (Bottom Right): 2.74 [.057]
- Feature 35 (Bottom Right): 2.64 [.051]
- Feature 36 (Bottom Right): 2.54 [.045]
- Feature 37 (Bottom Right): 2.44 [.039]
- Feature 38 (Bottom Right): 2.34 [.033]
- Feature 39 (Bottom Right): 2.24 [.027]
- Feature 40 (Bottom Right): 2.14 [.021]
- Feature 41 (Bottom Right): 2.04 [.015]
- Feature 42 (Bottom Right): 1.94 [.009]
- Feature 43 (Bottom Right): 1.84 [.003]
- Feature 44 (Bottom Right): 1.74 [0]
- Feature 45 (Bottom Right): 1.64 [-.003]
- Feature 46 (Bottom Right): 1.54 [-.009]
- Feature 47 (Bottom Right): 1.44 [-.015]
- Feature 48 (Bottom Right): 1.34 [-.021]
- Feature 49 (Bottom Right): 1.24 [-.027]
- Feature 50 (Bottom Right): 1.14 [-.033]
- Feature 51 (Bottom Right): 1.04 [-.039]
- Feature 52 (Bottom Right): .94 [-.045]
- Feature 53 (Bottom Right): .84 [-.051]
- Feature 54 (Bottom Right): .74 [-.057]
- Feature 55 (Bottom Right): .64 [-.063]
- Feature 56 (Bottom Right): .54 [-.069]
- Feature 57 (Bottom Right): .44 [-.075]
- Feature 58 (Bottom Right): .34 [-.081]
- Feature 59 (Bottom Right): .24 [-.087]
- Feature 60 (Bottom Right): .14 [-.093]
- Feature 61 (Bottom Right): .04 [-.099]
- Feature 62 (Bottom Right): 0 [-.105]
- Feature 63 (Bottom Right): -.04 [-.111]
- Feature 64 (Bottom Right): -.14 [-.117]
- Feature 65 (Bottom Right): -.24 [-.123]
- Feature 66 (Bottom Right): -.34 [-.129]
- Feature 67 (Bottom Right): -.44 [-.135]
- Feature 68 (Bottom Right): -.54 [-.141]
- Feature 69 (Bottom Right): -.64 [-.147]
- Feature 70 (Bottom Right): -.74 [-.153]
- Feature 71 (Bottom Right): -.84 [-.159]
- Feature 72 (Bottom Right): -.94 [-.165]
- Feature 73 (Bottom Right): -1.04 [-.171]
- Feature 74 (Bottom Right): -1.14 [-.177]
- Feature 75 (Bottom Right): -1.24 [-.183]
- Feature 76 (Bottom Right): -1.34 [-.189]
- Feature 77 (Bottom Right): -1.44 [-.195]
- Feature 78 (Bottom Right): -1.54 [-.201]
- Feature 79 (Bottom Right): -1.64 [-.207]
- Feature 80 (Bottom Right): -1.74 [-.213]
- Feature 81 (Bottom Right): -1.84 [-.219]
- Feature 82 (Bottom Right): -1.94 [-.225]
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- Feature 84 (Bottom Right): -2.14 [-.237]
- Feature 85 (Bottom Right): -2.24 [-.243]
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- Feature 87 (Bottom Right): -2.44 [-.255]
- Feature 88 (Bottom Right): -2.54 [-.261]
- Feature 89 (Bottom Right): -2.64 [-.267]
- Feature 90 (Bottom Right): -2.74 [-.273]
- Feature 91 (Bottom Right): -2.84 [-.279]
- Feature 92 (Bottom Right): -2.94 [-.285]
- Feature 93 (Bottom Right): -3.04 [-.291]
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- Feature 95 (Bottom Right): -3.24 [-.303]
- Feature 96 (Bottom Right): -3.34 [-.309]
- Feature 97 (Bottom Right): -3.44 [-.315]
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- Feature 102 (Bottom Right): -3.94 [-.345]
- Feature 103 (Bottom Right): -4.04 [-.351]
- Feature 104 (Bottom Right): -4.14 [-.357]
- Feature 105 (Bottom Right): -4.24 [-.363]
- Feature 106 (Bottom Right): -4.34 [-.369]
- Feature 107 (Bottom Right): -4.44 [-.375]
- Feature 108 (Bottom Right): -4.54 [-.381]
- Feature 109 (Bottom Right): -4.64 [-.387]
- Feature 110 (Bottom Right): -4.74 [-.393]
- Feature 111 (Bottom Right): -4.84 [-.399]
- Feature 112 (Bottom Right): -4.94 [-.405]
- Feature 113 (Bottom Right): -5.04 [-.411]
- Feature 114 (Bottom Right): -5.14 [-.417]
- Feature 115 (Bottom Right): -5.24 [-.423]
- Feature 116 (Bottom Right): -5.34 [-.429]
- Feature 117 (Bottom Right): -5.44 [-.435]
- Feature 118 (Bottom Right): -5.54 [-.441]
- Feature 119 (Bottom Right): -5.64 [-.447]
- Feature 120 (Bottom Right): -5.74 [-.453]
- Feature 121 (Bottom Right): -5.84 [-.459]
- Feature 122 (Bottom Right): -5.94 [-.465]
- Feature 123 (Bottom Right): -6.04 [-.471]
- Feature 124 (Bottom Right): -6.14 [-.477]
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- Feature 127 (Bottom Right): -6.44 [-.495]
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- Feature 129 (Bottom Right): -6.64 [-.507]
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- Feature 132 (Bottom Right): -6.94 [-.525]
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- Feature 134 (Bottom Right): -7.14 [-.537]
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- Feature 136 (Bottom Right): -7.34 [-.549]
- Feature 137 (Bottom Right): -7.44 [-.555]
- Feature 138 (Bottom Right): -7.54 [-.561]
- Feature 139 (Bottom Right): -7.64 [-.567]
- Feature 140 (Bottom Right): -7.74 [-.573]
- Feature 141 (Bottom Right): -7.84 [-.579]
- Feature 142 (Bottom Right): -7.94 [-.585]
- Feature 143 (Bottom Right): -8.04 [-.591]
- Feature 144 (Bottom Right): -8.14 [-.597]
- Feature 145 (Bottom Right): -8.24 [-.603]
- Feature 146 (Bottom Right): -8.34 [-.609]
- Feature 147 (Bottom Right): -8.44 [-.615]
- Feature 148 (Bottom Right): -8.54 [-.621]
- Feature 149 (Bottom Right): -8.64 [-.627]
- Feature 150 (Bottom Right): -8.74 [-.633]
- Feature 151 (Bottom Right): -8.84 [-.639]
- Feature 152 (Bottom Right): -8.94 [-.645]
- Feature 153 (Bottom Right): -9.04 [-.651]
- Feature 154 (Bottom Right): -9.14 [-.657]
- Feature 155 (Bottom Right): -9.24 [-.663]
- Feature 156 (Bottom Right): -9.34 [-.669]
- Feature 157 (Bottom Right): -9.44 [-.675]
- Feature 158 (Bottom Right): -9.54 [-.681]
- Feature 159 (Bottom Right): -9.64 [-.687]
- Feature 160 (Bottom Right): -9.74 [-.693]
- Feature 161 (Bottom Right): -9.84 [-.699]
- Feature 162 (Bottom Right): -9.94 [-.705]
- Feature 163 (Bottom Right): -10.04 [-.711]
- Feature 164 (Bottom Right): -10.

1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].

- 1 = DRAIN
2 = GATE
3 = SOURCE

IMPORTANT NOTICE

The information given in this document shall be in no event regarded as guarantee of conditions or characteristic. The data contained herein is a characterization of the component based on internal standards and is intended to demonstrate and provide guidance for typical part performance. It will require further evaluation, qualification and analysis to determine suitability in the application environment to confirm compliance to your system requirements.

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