

FEATURES

- ◆ Avalanche Rugged Technology
- ◆ Rugged Gate Oxide Technology
- ◆ Lower Input Capacitance
- ◆ Improved Gate Charge
- ◆ Extended Safe Operating Area
- ◆ Lower Leakage Current: 10 μ A (Max.) @ $V_{DS} = 100V$
- ◆ Lower $R_{DS(on)}$: 0.101 Ω (Typ.)

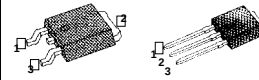
$$BV_{DSS} = 100 V$$

$$R_{DS(on)} = 0.12\Omega$$

$$I_D = 13 A$$

D-PAK

I-PAK



1. Gate 2. Drain 3. Source

Absolute Maximum Ratings

Symbol	Characteristic	Value	Units
V_{DSS}	Drain-to-Source Voltage	100	V
I_D	Continuous Drain Current ($T_C=25^\circ C$)	13	A
	Continuous Drain Current ($T_C=100^\circ C$)	8	
I_{DM}	Drain Current-Pulsed (1)	45	A
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (2)	225	mJ
I_{AR}	Avalanche Current (1)	13	A
E_{AR}	Repetitive Avalanche Energy (1)	4.6	mJ
dv/dt	Peak Diode Recovery dv/dt (3)	6.5	V/ns
P_D	Total Power Dissipation ($T_A=25^\circ C$) *	2.5	W
	Total Power Dissipation ($T_C=25^\circ C$)	46	W
	Linear Derating Factor	0.37	W/ $^\circ C$
T_J, T_{STG}	Operating Junction and Storage Temperature Range	- 55 to +150	$^\circ C$
T_L	Maximum Lead Temp. for Soldering Purposes, 1/8. from case for 5-seconds	300	

Thermal Resistance

Symbol	Characteristic	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	--	2.7	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient *	--	50	
$R_{\theta JA}$	Junction-to-Ambient	--	110	

* When mounted on the minimum pad size recommended (PCB Mount).

Rev. B

Electrical Characteristics ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
BV_{DSS}	Drain-Source Breakdown Voltage	100	--	--	V	$V_{GS}=0V, I_D=250\mu A$
$\Delta BV/\Delta T_J$	Breakdown Voltage Temp. Coeff.	--	0.1	--	V/°C	$I_D=250\mu A$ See Fig 7
$V_{GS(th)}$	Gate Threshold Voltage	1.0	--	2.0	V	$V_{DS}=5V, I_D=250\mu A$
I_{GSS}	Gate-Source Leakage, Forward	--	--	100	nA	$V_{GS}=20V$
	Gate-Source Leakage, Reverse	--	--	-100	nA	$V_{GS}=-20V$
I_{DSS}	Drain-to-Source Leakage Current	--	--	10	μA	$V_{DS}=100V$
		--	--	100	μA	$V_{DS}=80V, T_C=150^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-State Resistance	--	--	0.12	Ω	$V_{GS}=5V, I_D=6.5A$ (4)
g_{fs}	Forward Transconductance	--	10.1	--	S	$V_{DS}=40V, I_D=6.5A$ (4)
C_{iss}	Input Capacitance	--	580	755	pF	$V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$ See Fig 5
C_{oss}	Output Capacitance	--	140	175		
C_{rss}	Reverse Transfer Capacitance	--	60	75		
$t_{d(on)}$	Turn-On Delay Time	--	10	30	ns	$V_{DD}=50V, I_D=14A,$ $R_G=6\Omega$ See Fig 13 (4) (5)
t_r	Rise Time	--	11	30		
$t_{d(off)}$	Turn-Off Delay Time	--	29	70		
t_f	Fall Time	--	15	40		
Q_g	Total Gate Charge	--	16.9	24	nC	$V_{DS}=80V, V_{GS}=5V,$ $I_D=14A$ See Fig 6 & Fig 12 (4) (5)
Q_{gs}	Gate-Source Charge	--	2.7	--		
Q_{gd}	Gate-Drain (. Miller.) Charge	--	9.7	--		

Source-Drain Diode Ratings and Characteristics

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
I_S	Continuous Source Current	--	--	13	A	Integral reverse pn-diode in the MOSFET
I_{SM}	Pulsed-Source Current (1)	--	--	45		
V_{SD}	Diode Forward Voltage (4)	--	--	1.5	V	$T_J=25^\circ\text{C}, I_S=13A, V_{GS}=0V$
t_{rr}	Reverse Recovery Time	--	109	--	ns	$T_J=25^\circ\text{C}, I_F=14A$
Q_{rr}	Reverse Recovery Charge	--	0.41	--	μC	$di_F/dt=100A/\mu s$ (4)

Notes;

- (1) Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
- (2) $L=2\text{mH}, I_{AS}=13A, V_{DD}=25V, R_G=27\Omega$, Starting $T_J=25^\circ\text{C}$
- (3) $I_{SD} \leq 14A, di/dt \leq 350A/\mu s, V_{DD} \leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$
- (4) Pulse Test: Pulse Width = $250\mu s$, Duty Cycle $\leq 2\%$
- (5) Essentially Independent of Operating Temperature

Fig 1. Output Characteristics

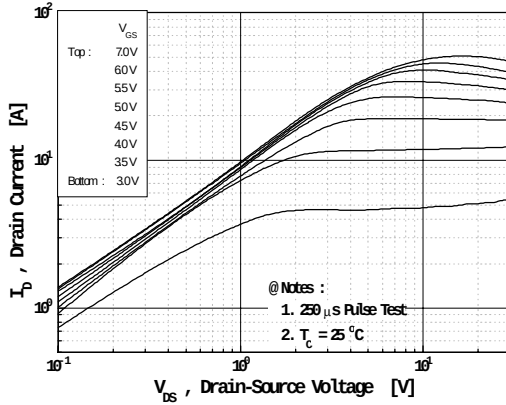


Fig 2. Transfer Characteristics

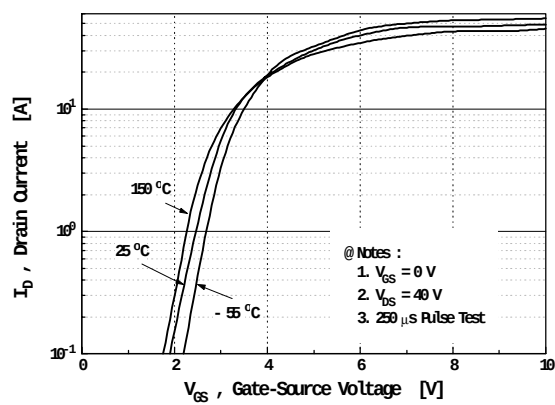


Fig 3. On-Resistance vs. Drain Current

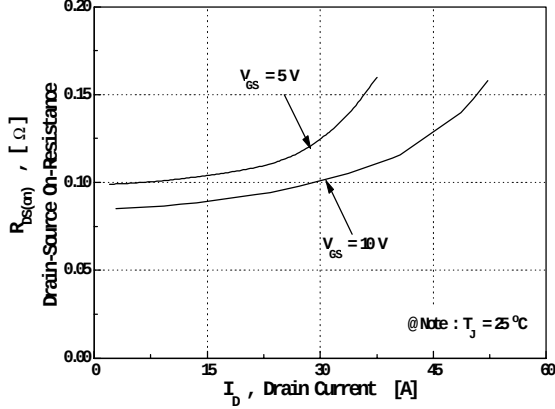


Fig 4. Source-Drain Diode Forward Voltage

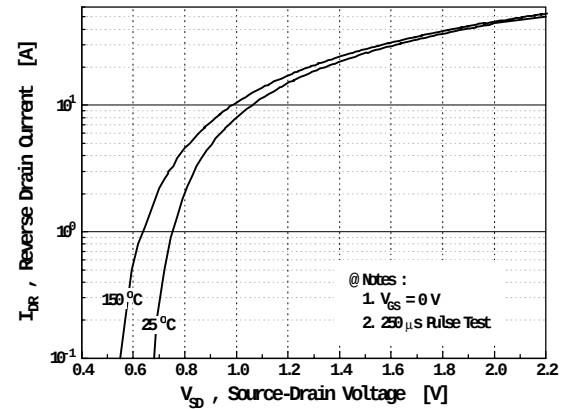


Fig 5. Capacitance vs. Drain-Source Voltage

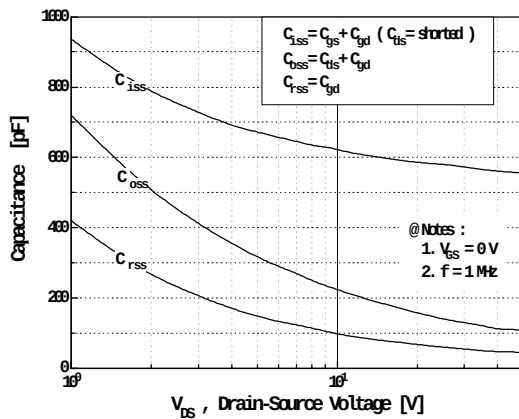


Fig 6. Gate Charge vs. Gate-Source Voltage

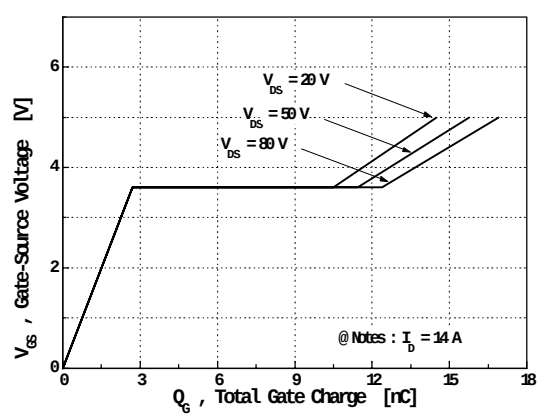


Fig 7. Breakdown Voltage vs. Temperature

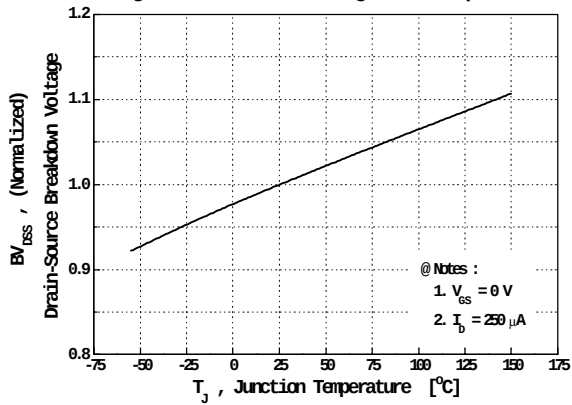


Fig 8. On-Resistance vs. Temperature

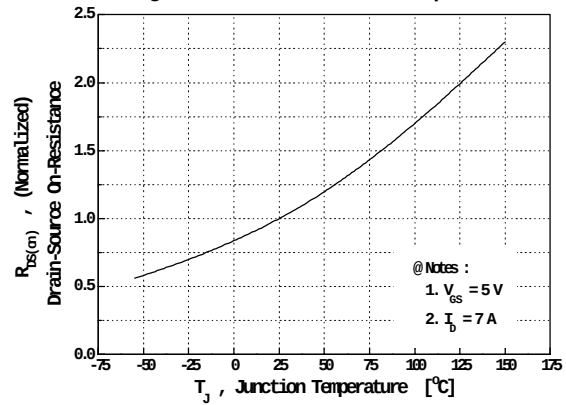


Fig 9. Max. Safe Operating Area

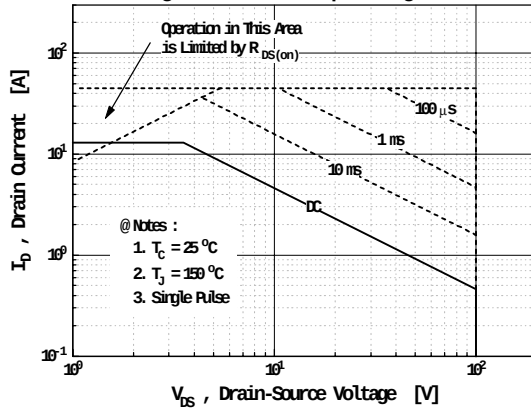


Fig 10. Max. Drain Current vs. Case Temperature

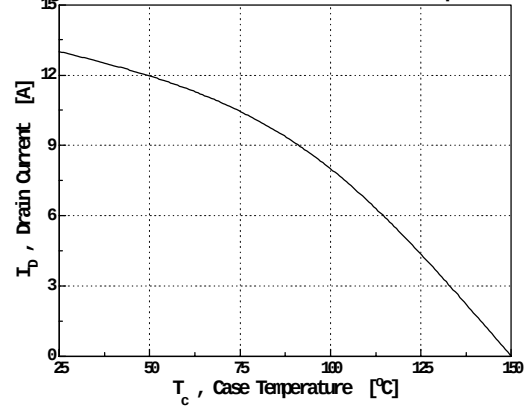


Fig 11. Thermal Response

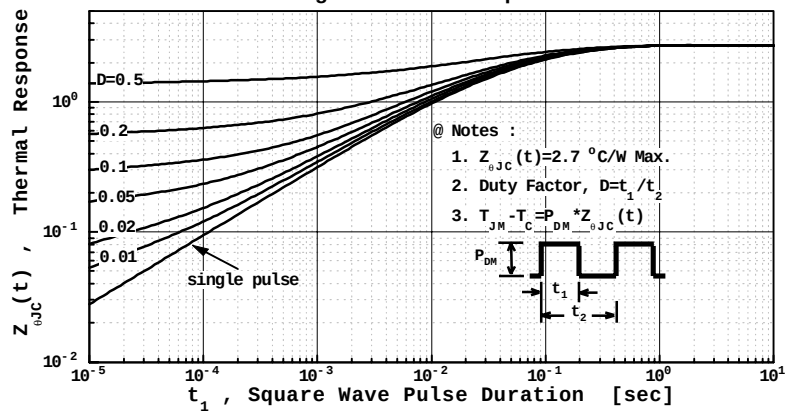


Fig 12. Gate Charge Test Circuit & Waveform

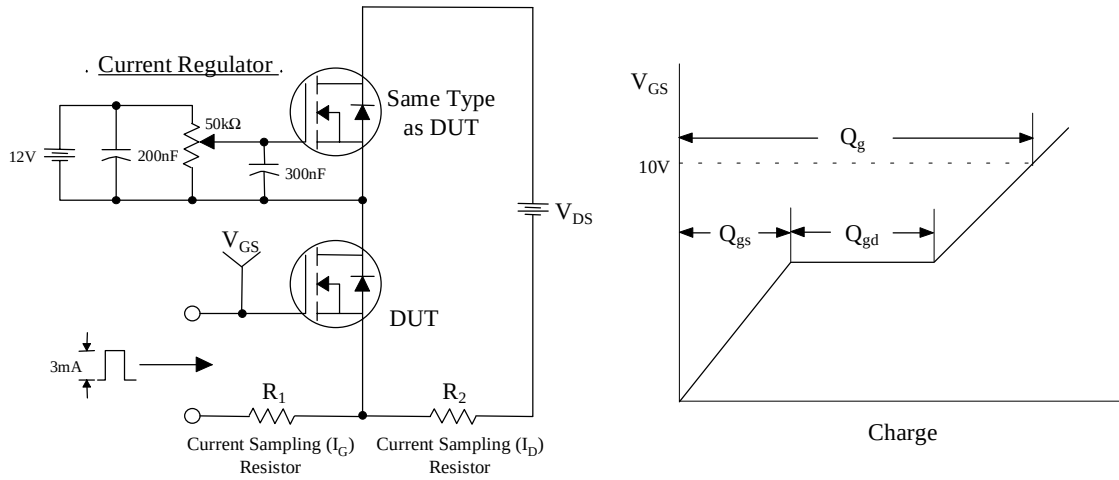


Fig 13. Resistive Switching Test Circuit & Waveforms

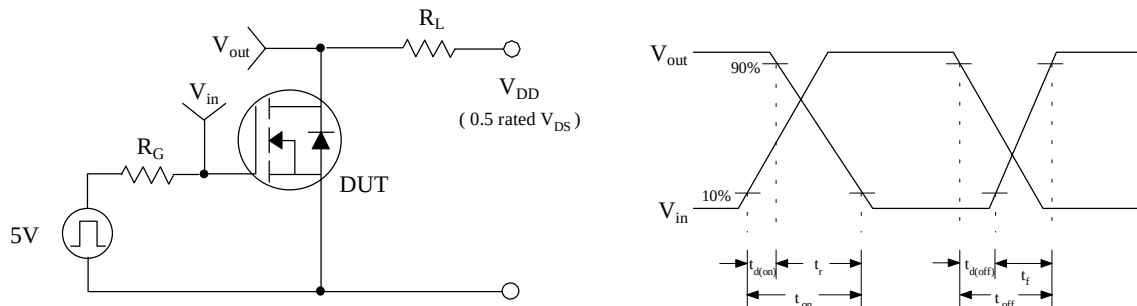


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

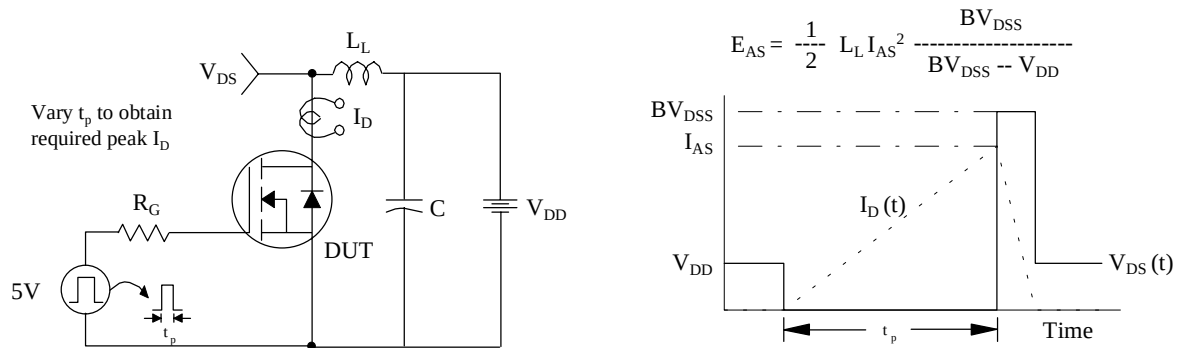
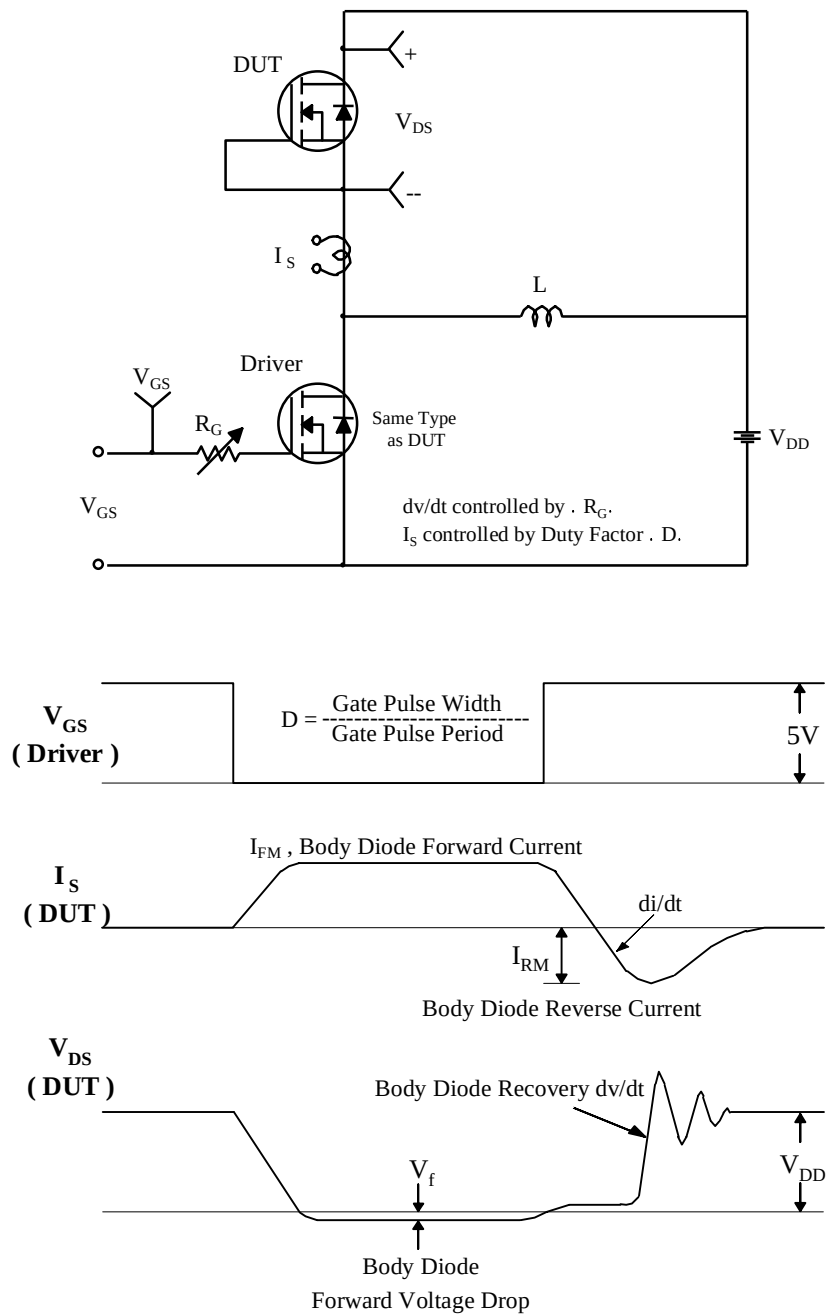
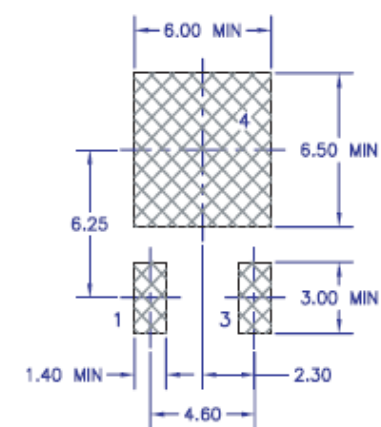


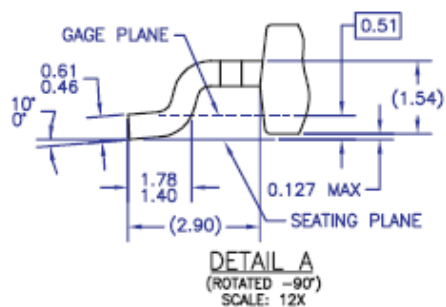
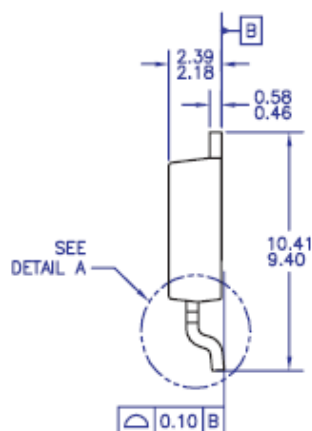
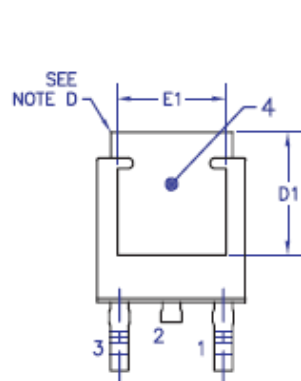
Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



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[illegible]

LAND PATTERN RECOMMENDATION



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Technical drawing of a mechanical part, showing front, side, and top views with dimensions and tolerances.

Front View (Left):

- Overall width: 6.80 (tolerance 6.35)
- Inner width: 5.54 (tolerance 5.14)
- Feature 4: A rectangular notch at the top.
- Feature 1: A vertical pin on the left.
- Feature 2: A vertical pin in the center.
- Feature 3: A vertical pin on the right.
- Feature 1.14: A horizontal dimension for the right pin.
- Feature 2.29: A horizontal dimension for the center pin.
- Feature 0.88 / 0.64: A horizontal dimension for the left pin.
- Feature 0.60: A horizontal dimension for the left pin.
- Feature 1.52 / 0.70: A vertical dimension for the top of the pins.
- Feature 2.28 / 1.60: A vertical dimension for the top of the pins.
- Feature 6.30 / 5.90: A vertical dimension for the top of the pins.
- Feature 9.65 / 8.90: A vertical dimension for the bottom of the pins.
- Feature 1.27 / 0.50: A vertical dimension for the top of the pins.
- Feature 2.50 / 2.10: A vertical dimension for the top of the pins.
- Feature 0.60 / 0.40: A vertical dimension for the top of the pins.
- Feature 1.14 / 0.90: A vertical dimension for the top of the pins.
- Feature 0.60 / 0.40: A vertical dimension for the top of the pins.

Side View (Right):

- Overall width: 6.80 (tolerance 6.35)
- Inner width: 5.54 (tolerance 5.14)
- Feature 4: A rectangular notch at the top.
- Feature 1: A vertical pin on the left.
- Feature 2: A vertical pin in the center.
- Feature 3: A vertical pin on the right.
- Feature 1.14: A horizontal dimension for the right pin.
- Feature 2.29: A horizontal dimension for the center pin.
- Feature 0.88 / 0.64: A horizontal dimension for the left pin.
- Feature 0.60: A horizontal dimension for the left pin.
- Feature 1.52 / 0.70: A vertical dimension for the top of the pins.
- Feature 2.28 / 1.60: A vertical dimension for the top of the pins.
- Feature 6.30 / 5.90: A vertical dimension for the top of the pins.
- Feature 9.65 / 8.90: A vertical dimension for the bottom of the pins.
- Feature 1.27 / 0.50: A vertical dimension for the top of the pins.
- Feature 2.50 / 2.10: A vertical dimension for the top of the pins.
- Feature 0.60 / 0.40: A vertical dimension for the top of the pins.
- Feature 1.14 / 0.90: A vertical dimension for the top of the pins.
- Feature 0.60 / 0.40: A vertical dimension for the top of the pins.

Top View (Bottom):

- Overall width: 6.80 (tolerance 6.35)
- Inner width: 5.54 (tolerance 5.14)
- Feature 4: A rectangular notch at the top.
- Feature 1: A vertical pin on the left.
- Feature 2: A vertical pin in the center.
- Feature 3: A vertical pin on the right.
- Feature 1.14: A horizontal dimension for the right pin.
- Feature 2.29: A horizontal dimension for the center pin.
- Feature 0.88 / 0.64: A horizontal dimension for the left pin.
- Feature 0.60: A horizontal dimension for the left pin.
- Feature 1.52 / 0.70: A vertical dimension for the top of the pins.
- Feature 2.28 / 1.60: A vertical dimension for the top of the pins.
- Feature 6.30 / 5.90: A vertical dimension for the top of the pins.
- Feature 9.65 / 8.90: A vertical dimension for the bottom of the pins.
- Feature 1.27 / 0.50: A vertical dimension for the top of the pins.
- Feature 2.50 / 2.10: A vertical dimension for the top of the pins.
- Feature 0.60 / 0.40: A vertical dimension for the top of the pins.
- Feature 1.14 / 0.90: A vertical dimension for the top of the pins.
- Feature 0.60 / 0.40: A vertical dimension for the top of the pins.

Annotations:

- Feature 1: A vertical pin on the left.
- Feature 2: A vertical pin in the center.
- Feature 3: A vertical pin on the right.
- Feature 4: A rectangular notch at the top.
- Feature 1.14: A horizontal dimension for the right pin.
- Feature 2.29: A horizontal dimension for the center pin.
- Feature 0.88 / 0.64: A horizontal dimension for the left pin.
- Feature 0.60: A horizontal dimension for the left pin.
- Feature 1.52 / 0.70: A vertical dimension for the top of the pins.
- Feature 2.28 / 1.60: A vertical dimension for the top of the pins.
- Feature 6.30 / 5.90: A vertical dimension for the top of the pins.
- Feature 9.65 / 8.90: A vertical dimension for the bottom of the pins.
- Feature 1.27 / 0.50: A vertical dimension for the top of the pins.
- Feature 2.50 / 2.10: A vertical dimension for the top of the pins.
- Feature 0.60 / 0.40: A vertical dimension for the top of the pins.
- Feature 1.14 / 0.90: A vertical dimension for the top of the pins.
- Feature 0.60 / 0.40: A vertical dimension for the top of the pins.

Surface Finish:

- Feature 0.25 (tolerance 0.125) (tolerance 0.0625) (tolerance 0.03125) (tolerance 0.015625) (tolerance 0.0078125) (tolerance 0.00390625) (tolerance 0.001953125) (tolerance 0.0009765625) (tolerance 0.00048828125) (tolerance 0.000244140625) (tolerance 0.0001220703125) (tolerance 0.00006103515625) (tolerance 0.000030517578125) (tolerance 0.0000152587890625) (tolerance 0.00000762939453125) (tolerance 0.000003814697265625) (tolerance 0.0000019073486328125) (tolerance 0.00000095367431640625) (tolerance 0.000000476837158203125) (tolerance 0.0000002384185791015625) (tolerance 0.00000011920928955078125) (tolerance 0.000000059604644775390625) (tolerance 0.0000000298023223876953125) (tolerance 0.00000001490116119384765625) (tolerance 0.000000007450580596923828125) (tolerance 0.0000000037252902984619140625) (tolerance 0.00000000186264514923095703125) (tolerance 0.000000000931322574615478515625) (tolerance 0.0000000004656612873077392578125) (tolerance 0.00000000023283064365386962890625) (tolerance 0.000000000116415321826934814453125) (tolerance 0.0000000000582076609134674072265625) (tolerance 0.00000000002910383045673370361328125) (tolerance 0.000000000014551915228366851806640625) (tolerance 0.0000000000072759576141834259033203125) (tolerance 0.00000000000363797880709171295166015625) (tolerance 0.000000000001818989403545856475830078125) (tolerance 0.0000000000009094947017729282379150390625) (tolerance 0.00000000000045474735088646411895751953125) (tolerance 0.000000000000227373675443232059478759765625) (tolerance 0.0000000000001136868377216160297393798828125) (tolerance 0.00000000000005684341886080801486968994140625) (tolerance 0.000000000000028421709430404007434844970703125) (tolerance 0.0000000000000142108547152020037174224853515625) (tolerance 0.00000000000000710542735760100185871124267578125) (tolerance 0.000000000000003552713678800500929355621337890625) (tolerance 0.0000000000000017763568394002504646778106689453125) (tolerance 0.00000000000000088817841970012523233890533447265625) (tolerance 0.000000000000000444089209850062616169452667236328125) (tolerance 0.0000000000000002220446049250313080847263336181640625) (tolerance 0.00000000000000011102230246251565404236316680908203125) (tolerance 0.000000000000000055511151231257827021181583404541015625) (tolerance 0.0000000000000000277555756156289135105907917022705078125) (tolerance 0.00000000000000001387778780781445675529539585113525390625) (tolerance 0.000000000000000006938893903907227877647697925567626953125) (tolerance 0.0000000000000000034694469519536139388238489627838134765625) (tolerance 0.00000000000000000173472347597

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