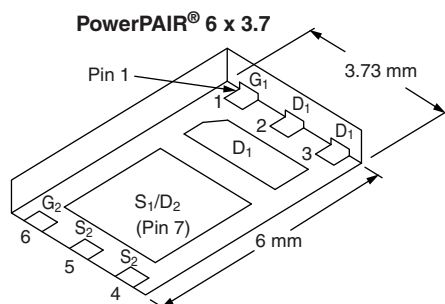


N-Channel 20 V (D-S) MOSFETs

PRODUCT SUMMARY

	V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A)	Q _g (Typ.)
Channel-1	20	0.0068 at V _{GS} = 10 V	16 ^a	6.9 nC
		0.0090 at V _{GS} = 4.5 V	16 ^a	
Channel-2	20	0.0033 at V _{GS} = 10 V	35 ^a	18.2 nC
		0.0043 at V _{GS} = 4.5 V	35 ^a	



Ordering Information:
SiZ710DT-T1-GE3 (Lead (Pb)-free and Halogen-free)

FEATURES

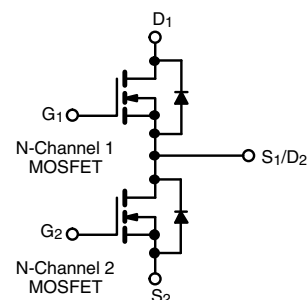
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFETs
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Notebook System Power
- POL
- Synchronous Buck Converter



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

Parameter		Symbol	Channel-1	Channel-2	Unit
Drain-Source Voltage		V _{DS}	20		V
Gate-Source Voltage		V _{GS}	± 20		
Continuous Drain Current (T _J = 150 °C)	T _C = 25 °C	I _D	16 ^a	35 ^a	A
	T _C = 70 °C		16 ^a	35 ^a	
	T _A = 25 °C		16 ^{a, b, c}	30 ^{b, c}	
	T _A = 70 °C		15 ^{b, c}	24 ^{b, c}	
Pulsed Drain Current		I _{DM}	70	100	
Continuous Source Drain Diode Current	T _C = 25 °C	I _S	16 ^a	35 ^a	
	T _A = 25 °C		3.2 ^{b, c}	3.8 ^{b, c}	
Single Pulse Avalanche Current	L = 0.1 mH	I _{AS}	20	30	
Single Pulse Avalanche Energy		E _{AS}	20	45	
Maximum Power Dissipation	T _C = 25 °C	P _D	27	48	W
	T _C = 70 °C		17	31	
	T _A = 25 °C		3.9 ^{b, c}	4.6 ^{b, c}	
	T _A = 70 °C		2.5 ^{b, c}	3 ^{b, c}	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 55 to 150		°C
Soldering Recommendations (Peak Temperature) ^{d, e}			260		

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Channel-1		Channel-2		Unit
		Typ.	Max.	Typ.	Max.	
Maximum Junction-to-Ambient ^{b, f}	R _{thJA}	24	32	20	27	°C/W
Maximum Junction-to-Case (Drain)	R _{thJC}	3.5	4.6	2	2.6	

Notes:

a. Package limited.

b. Surface mounted on 1" x 1" FR4 board.

c. t = 10 s.

d. See solder profile (www.vishay.com/doc?73257). The PowerPAIR is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.

e. Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.

f. Maximum under steady state conditions is 67 °C/W for channel-1 and 65 °C/W for channel-2.

SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)							
Parameter	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	Ch-1	20			V
		V _{GS} = 0 V, I _D = 250 μA	Ch-2	20			
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA	Ch-1		19		mV/°C
		I _D = 250 μA	Ch-2		20		
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J	I _D = 250 μA	Ch-1		- 4.8		
		I _D = 250 μA	Ch-2		- 5.3		
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	Ch-1	1		2.2	V
		V _{DS} = V _{GS} , I _D = 250 μA	Ch-2	1		2.2	
Gate Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V	Ch-1			± 100	nA
			Ch-2			± 100	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V	Ch-1			1	μA
		V _{DS} = 20 V, V _{GS} = 0 V	Ch-2			1	
		V _{DS} = 20 V, V _{GS} = 0 V, T _J = 55 °C	Ch-1			5	
		V _{DS} = 20 V, V _{GS} = 0 V, T _J = 55 °C	Ch-2			5	
On-State Drain Current ^b	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	Ch-1	15			A
		V _{DS} ≥ 5 V, V _{GS} = 10 V	Ch-2	20			
Drain-Source On-State Resistance ^b	R _{DS(on)}	V _{GS} = 10 V, I _D = 19 A	Ch-1		0.0055	0.0068	Ω
		V _{GS} = 10 V, I _D = 20 A	Ch-2		0.0027	0.0033	
		V _{GS} = 4.5 V, I _D = 16.5 A	Ch-1		0.0072	0.0090	
		V _{GS} = 4.5 V, I _D = 20 A	Ch-2		0.0034	0.0043	
Forward Transconductance ^b	g _{fs}	V _{DS} = 10 V, I _D = 19 A	Ch-1		45		S
		V _{DS} = 10 V, I _D = 20 A	Ch-2		85		
Dynamic ^a							
Input Capacitance	C _{iss}	Channel-1 V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	Ch-1		820		pF
			Ch-2		2310		
Output Capacitance	C _{oss}	Channel-2 V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	Ch-1		290		
			Ch-2		730		
Reverse Transfer Capacitance	C _{rss}		Ch-1		115		
			Ch-2		305		
Total Gate Charge	Q _g	V _{DS} = 10 V, V _{GS} = 10 V, I _D = 19 A	Ch-1		11.5	18	nC
		V _{DS} = 10 V, V _{GS} = 10 V, I _D = 20 A	Ch-2		38	60	
		Channel-1 V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 16.8 A	Ch-1		6.9	11	
			Ch-2		18.2	28	
Gate-Source Charge	Q _{gs}	Channel-2 V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 20 A	Ch-1		2.4		
			Ch-2		6.6		
Gate-Drain Charge	Q _{gd}		Ch-1		1.7		
			Ch-2		4.8		
Gate Resistance	R _g	f = 1 MHz	Ch-1	0.3	1.3	2.6	Ω
			Ch-2	0.2	0.8	1.6	

Notes:

a. Guaranteed by design, not subject to production testing.

b. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.



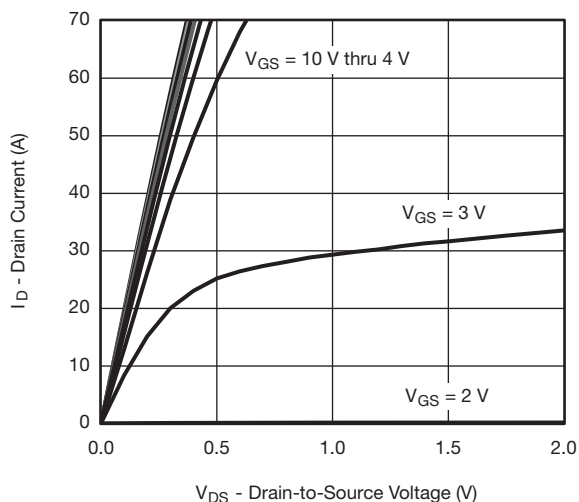
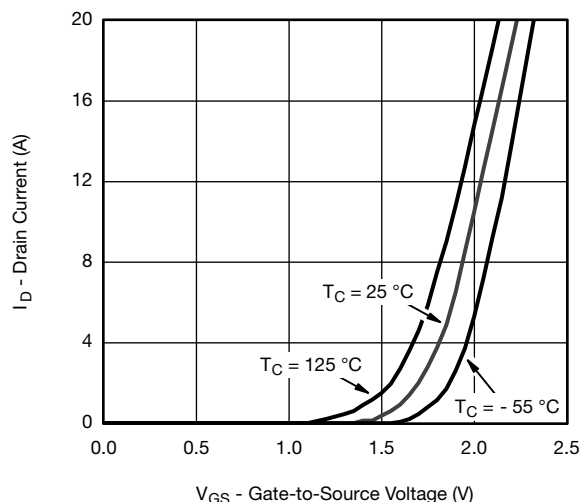
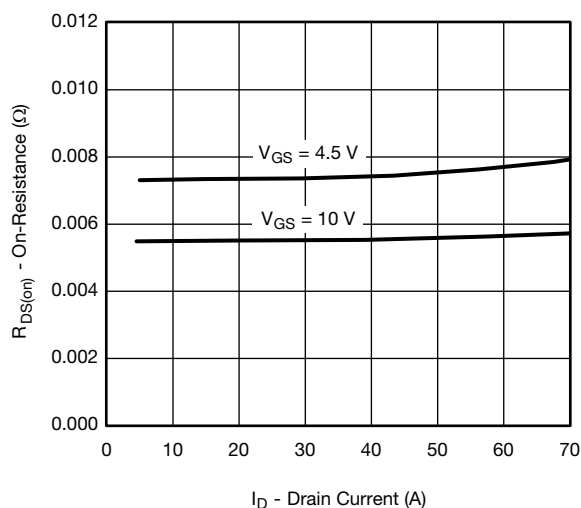
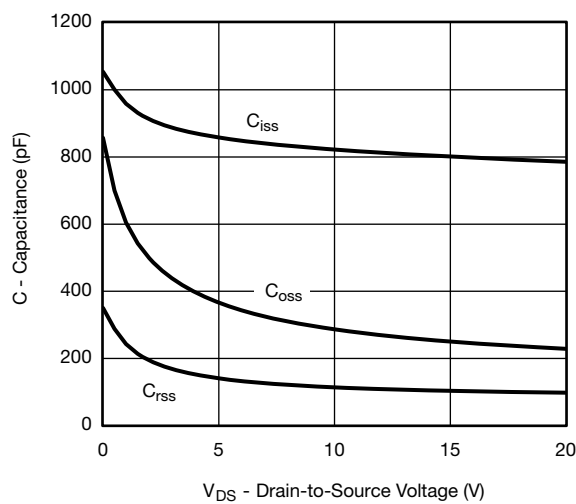
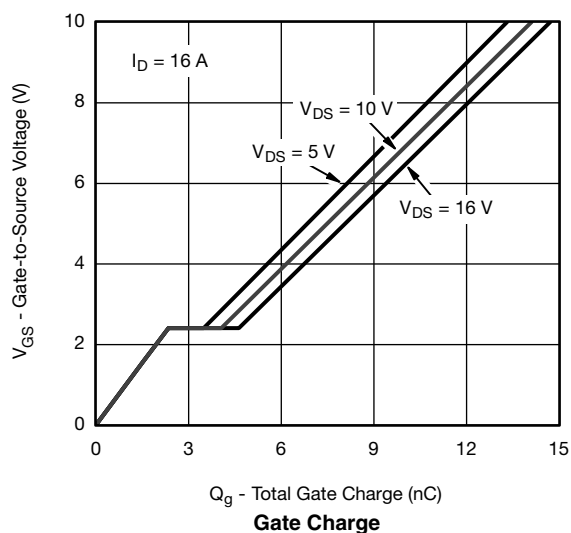
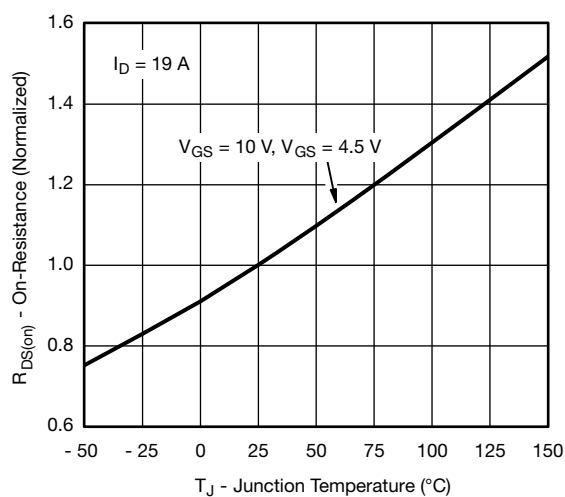
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)							
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Dynamic ^a							
Turn-On Delay Time	t _{d(on)}	Channel-1 V _{DD} = 10 V, R _L = 1 Ω I _D ≅ 10 A, V _{GEN} = 4.5 V, R _g = 1 Ω	Ch-1		15	30	ns
			Ch-2		25	50	
Rise Time	t _r		Ch-1		15	30	
			Ch-2		15	30	
Turn-Off Delay Time	t _{d(off)}	Ch-1		20	40		
		Ch-2		30	60		
Fall Time	t _f	Ch-1		12	25		
		Ch-2		12	25		
Turn-On Delay Time	t _{d(on)}	Channel-1 V _{DD} = 10 V, R _L = 1 Ω I _D ≅ 10 A, V _{GEN} = 10 V, R _g = 1 Ω	Ch-1		10	20	
			Ch-2		15	30	
Rise Time	t _r		Ch-1		12	25	
			Ch-2		8	15	
Turn-Off Delay Time	t _{d(off)}	Ch-1		20	40		
		Ch-2		30	60		
Fall Time	t _f	Ch-1		10	20		
		Ch-2		10	20		
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	Ch-1			16	A
			Ch-2			35	
Pulse Diode Forward Current ^a	I _{SM}		Ch-1			70	
			Ch-2			100	
Body Diode Voltage	V _{SD}	I _S = 10 A, V _{GS} = 0 V	Ch-1		0.8	1.2	V
		I _S = 10 A, V _{GS} = 0 V	Ch-2		0.78	1.2	
Body Diode Reverse Recovery Time	t _{rr}	Channel-1 I _F = 10 A, dI/dt = 100 A/μs, T _J = 25 °C	Ch-1		15	30	ns
			Ch-2		25	50	
Body Diode Reverse Recovery Charge	Q _{rr}		Ch-1		5.5	11	nC
			Ch-2		17	35	
Reverse Recovery Fall Time	t _a	Channel-2 I _F = 10 A, dI/dt = 100 A/μs, T _J = 25 °C	Ch-1		6		ns
			Ch-2		14		
Reverse Recovery Rise Time	t _b		Ch-1		9		
			Ch-2		11		

Notes:

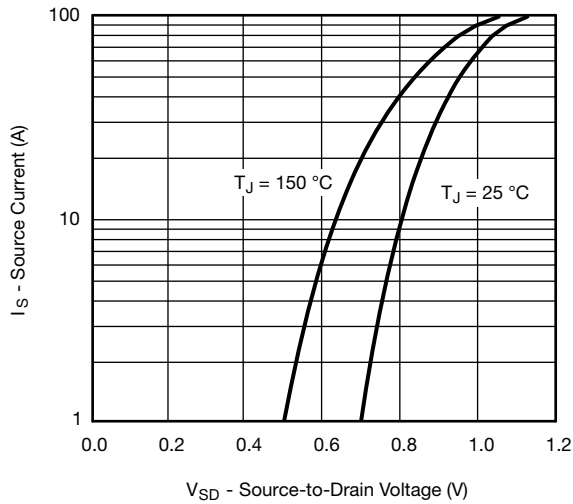
a. Guaranteed by design, not subject to production testing.

b. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

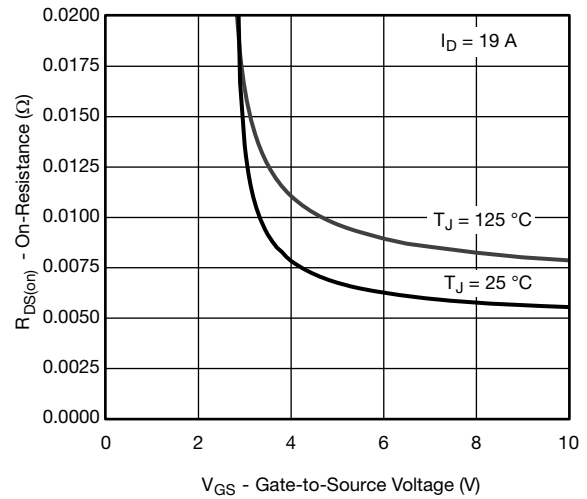
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)**Output Characteristics****Transfer Characteristics****On-Resistance vs. Drain Current****Capacitance****Gate Charge****On-Resistance vs. Junction Temperature**

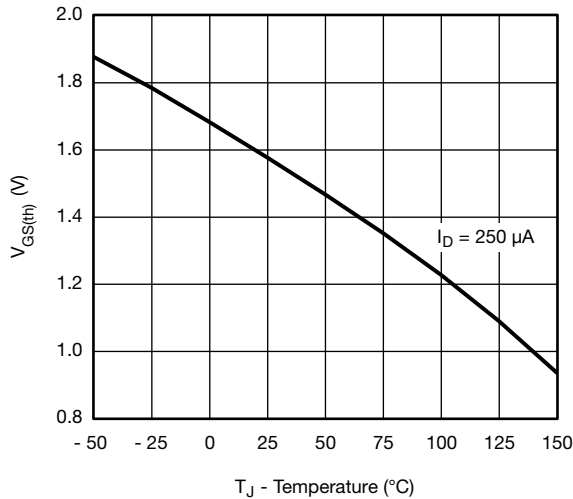
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



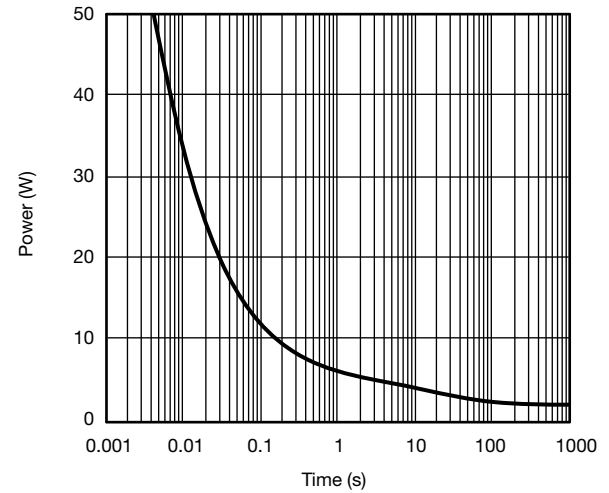
Source-Drain Diode Forward Voltage



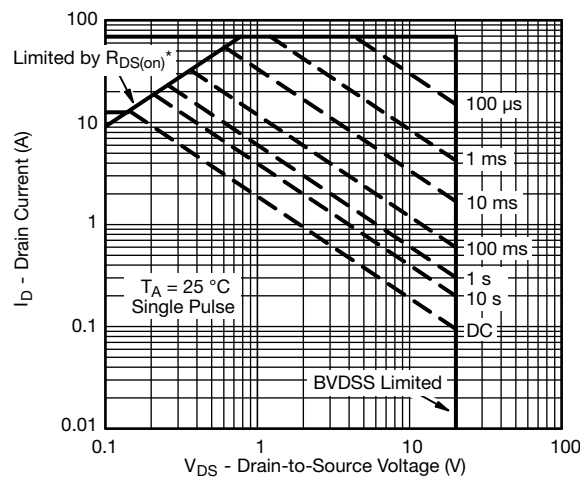
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

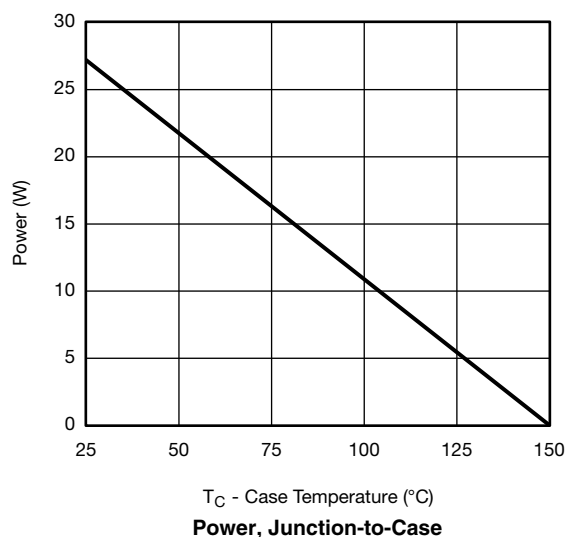
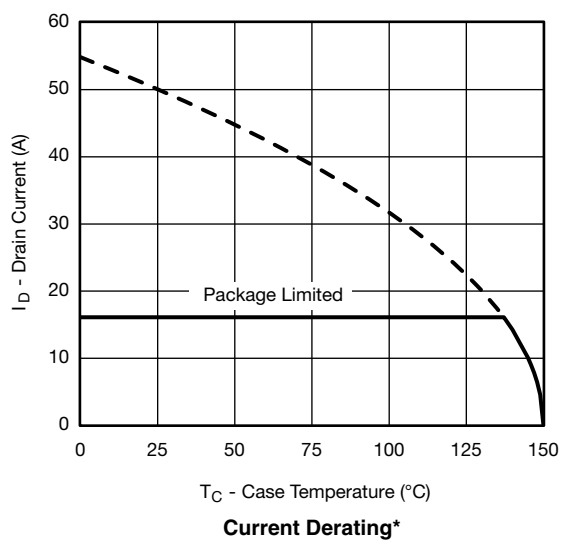


Single Pulse Power



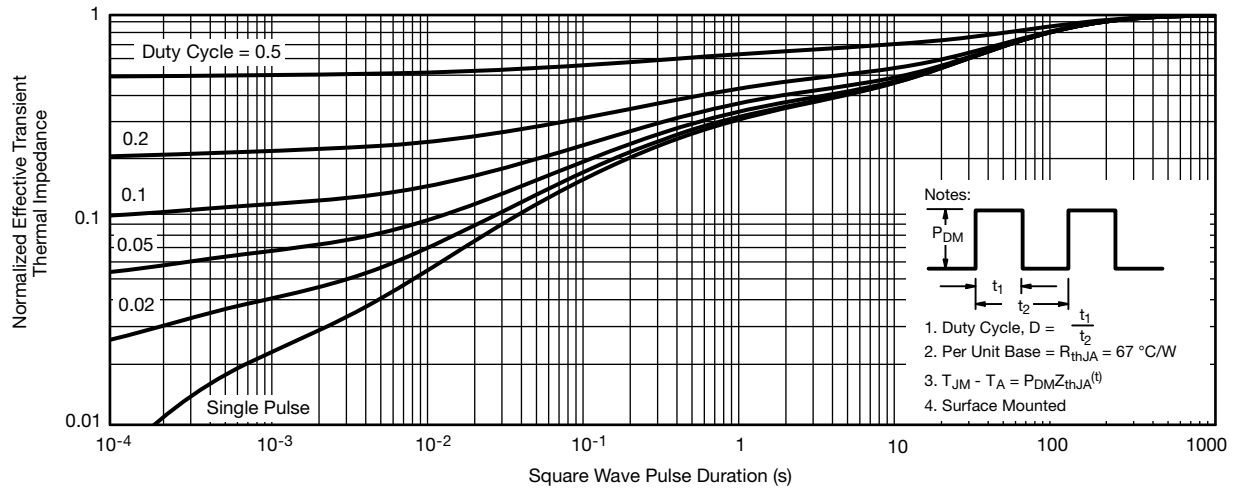
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

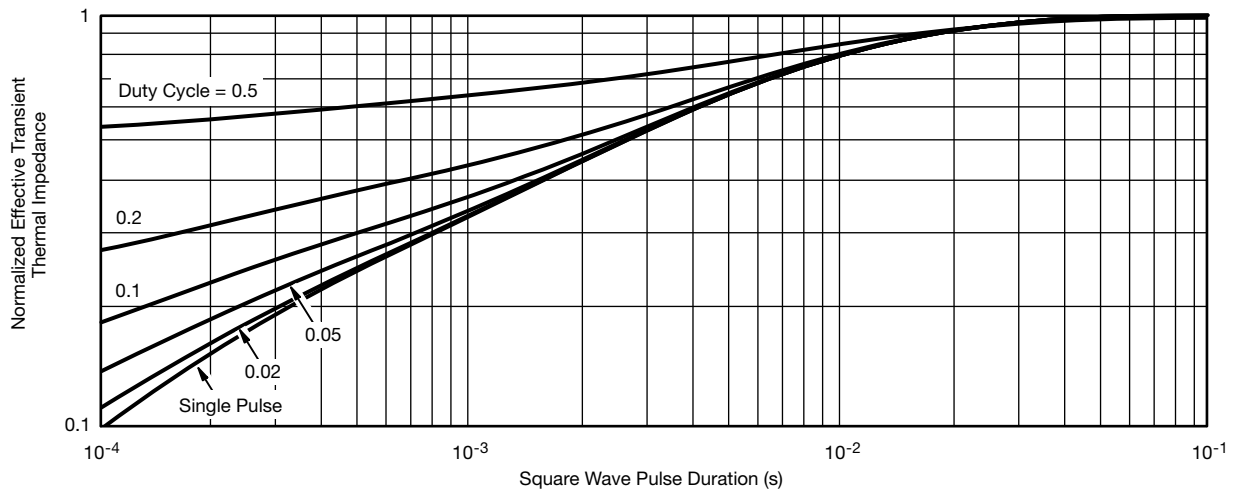
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

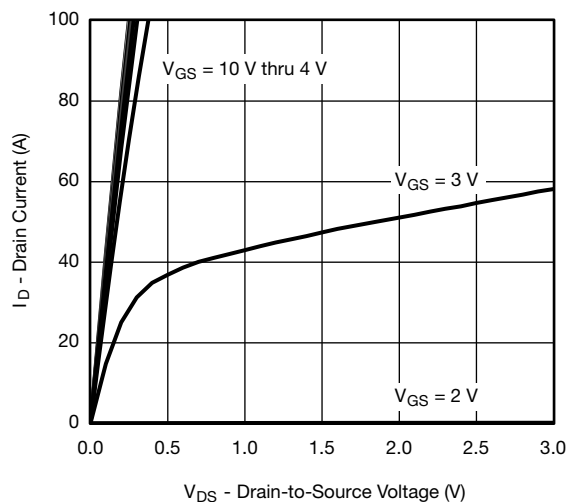
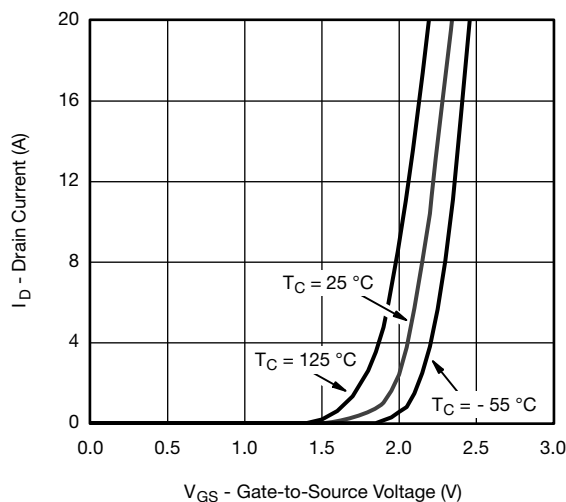
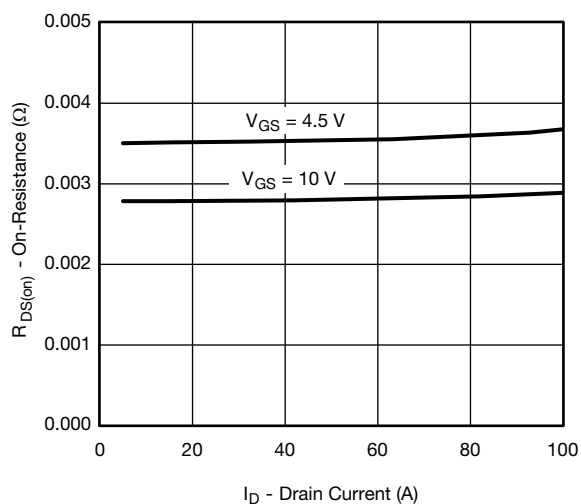
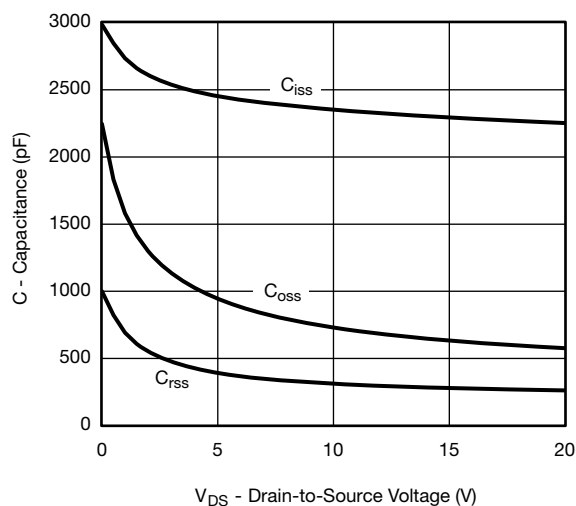
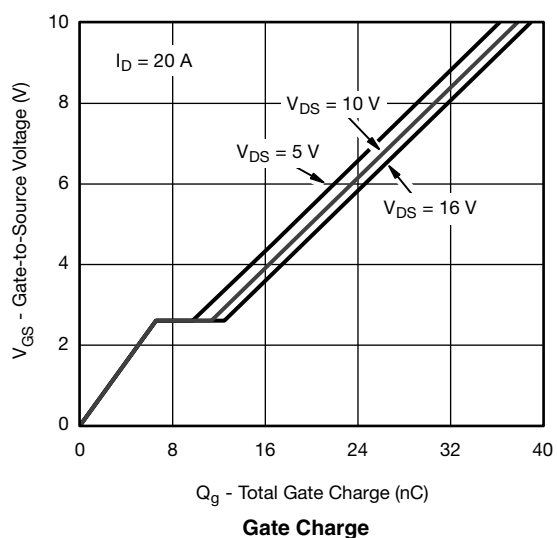
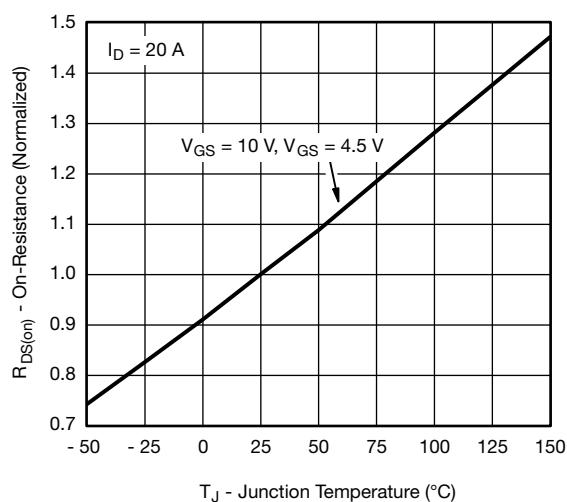
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



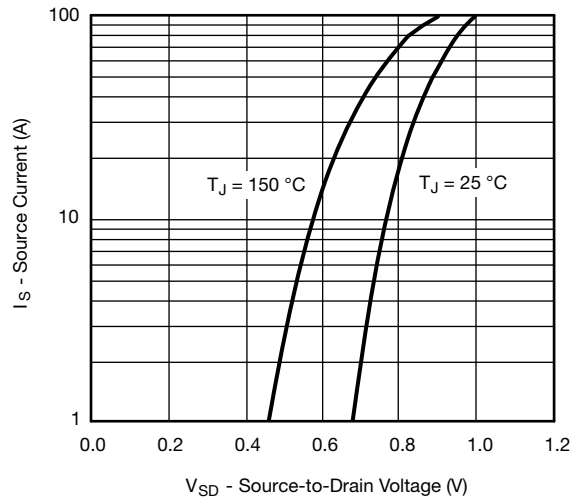
Normalized Thermal Transient Impedance, Junction-to-Ambient



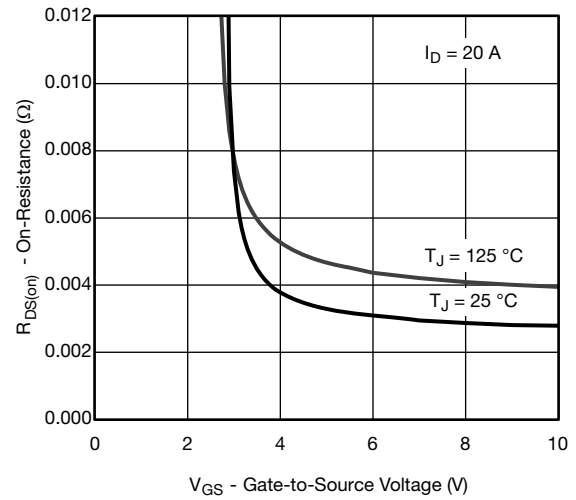
Normalized Thermal Transient Impedance, Junction-to-Case

CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)**Output Characteristics****Transfer Characteristics****On-Resistance vs. Drain Current****Capacitance****Gate Charge****On-Resistance vs. Junction Temperature**

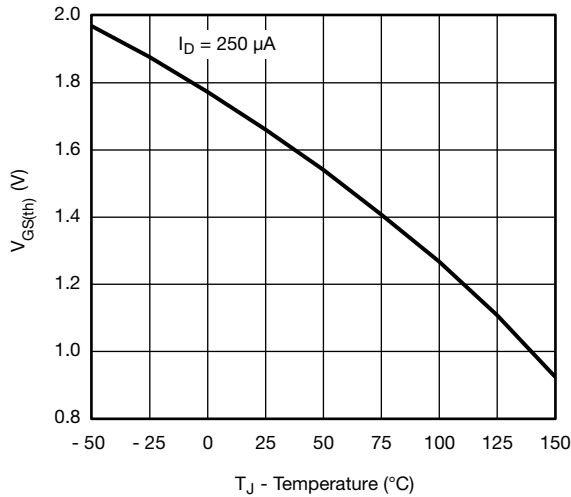
CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



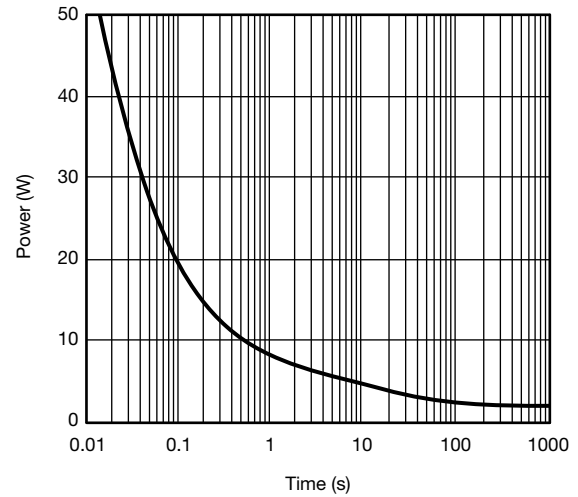
Source-Drain Diode Forward Voltage



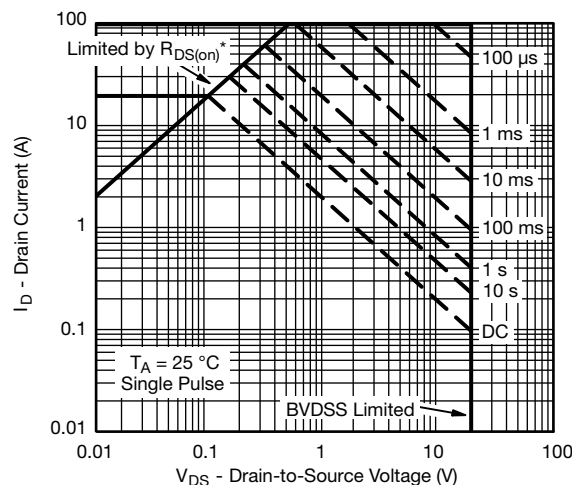
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

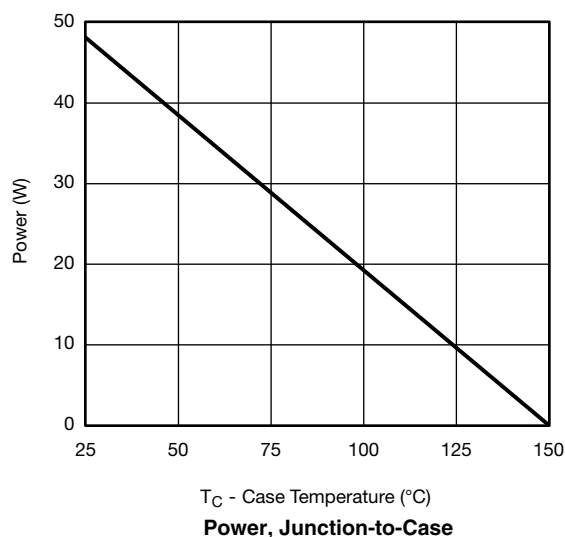
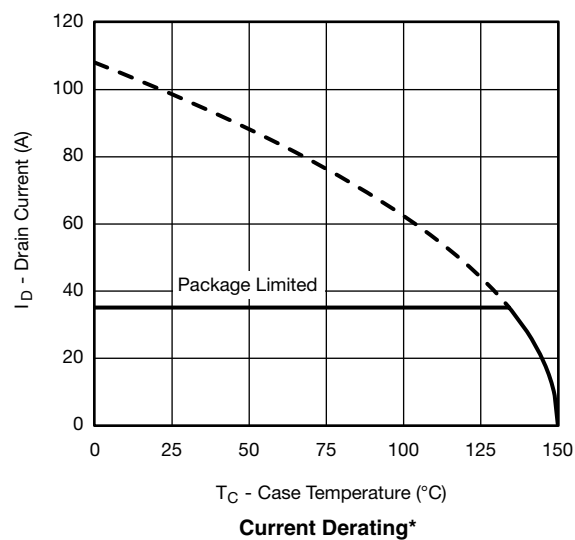


Single Pulse Power



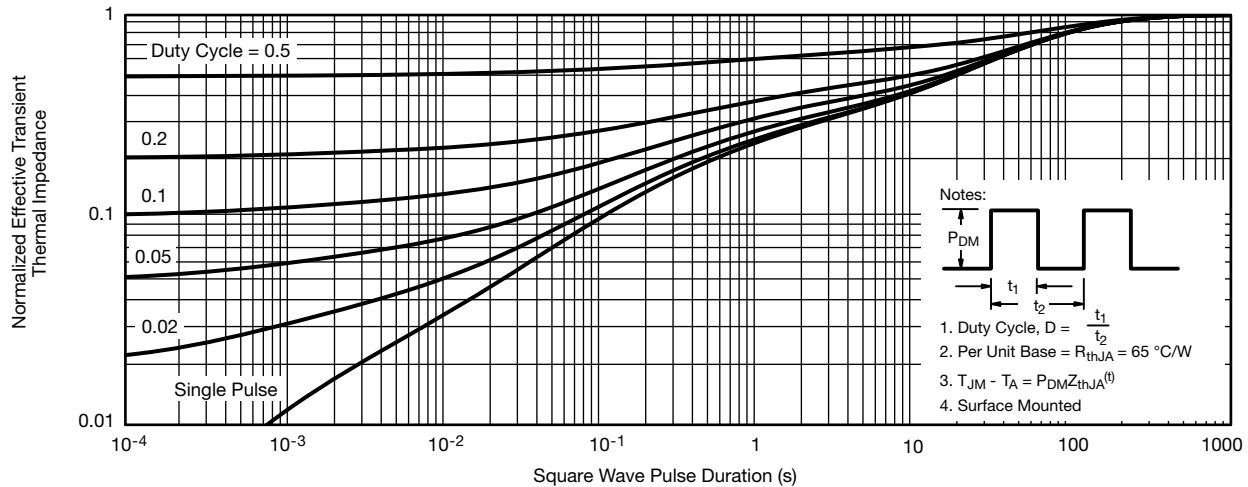
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

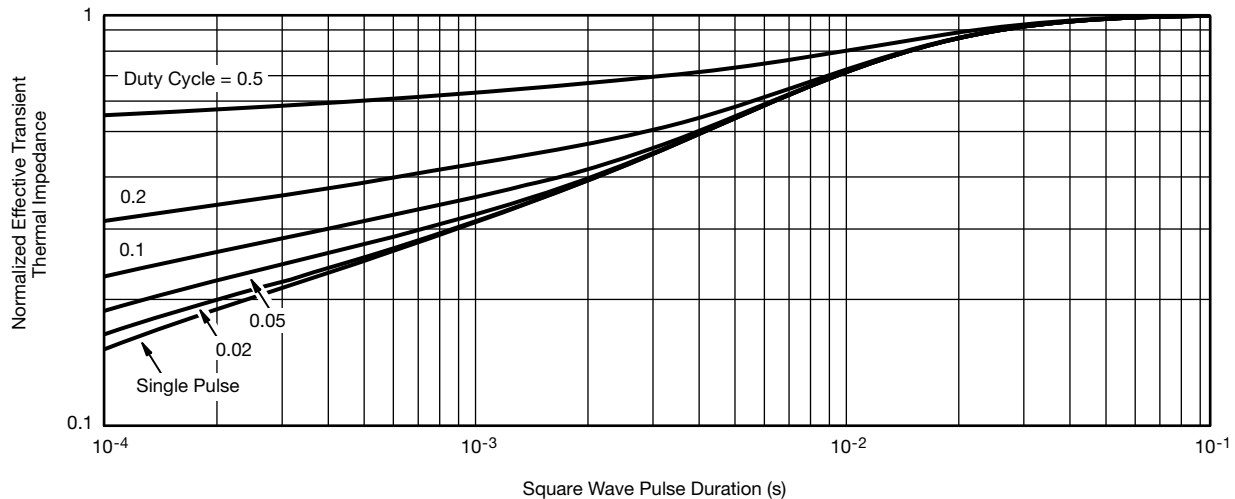
CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see www.vishay.com/ppg?65733.

PowerPAIR™ 6 x 3.7 CASE OUTLINE



DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	0.028	0.030	0.032
A1	0.00	-	0.05	0.000	-	0.002
b	0.46	0.51	0.56	0.018	0.020	0.022
b1	0.20	0.25	0.38	0.008	0.010	0.015
C	0.18	0.20	0.23	0.007	0.008	0.009
D	3.65	3.73	3.81	0.144	0.147	0.150
D1	2.41	2.53	2.65	0.095	0.100	0.104
E	5.92	6.00	6.08	0.233	0.236	0.239
E1	2.62	2.67	2.72	0.103	0.105	0.107
E2	0.87	0.92	0.97	0.034	0.036	0.038
e	1.27 BSC			0.05 BSC		
K	0.45 TYP.			0.018 TYP.		
K1	0.66 TYP.			0.026 TYP.		
K2	0.60 TYP.			0.024 TYP.		
L	0.38	0.43	0.48	0.015	0.017	0.019
ECN: S-82772-Rev. B, 17-Nov-08 DWG: 5979						

Technical drawing of a mechanical part, showing dimensions in inches and millimeters. The drawing includes a top view and a side view.

Top View Dimensions:

- Overall width: 0.3520 (8.941)
- Overall height: 0.4390 (11.151)
- Top edge features:
 - Left to right: a small square, a central square with a horizontal centerline, and another small square.
 - Horizontal distance from left edge to central square center: 0.0220 (0.559)
 - Horizontal distance between central and right squares: 0.0190 (0.483)
 - Vertical distance from top edge to central square center: 0, 0.11
- Central square features:
 - Width: 0.1040 (2.642)
 - Height: 0.1070 (2.718)
 - Horizontal centerline: 0, 0.03
 - Vertical centerline: 0, 0
- Bottom edge features:
 - Left to right: a small square, a central square with a horizontal centerline, and another small square.
 - Horizontal distance from left edge to central square center: 0.0220 (0.559)
 - Horizontal distance between central and right squares: 0.0380 (0.965)
 - Vertical distance from bottom edge to central square center: 0, -0.11

Side View Dimensions:

- Overall height: 0.4390 (11.151)
- Top edge features:
 - Left to right: a small square, a central square with a horizontal centerline, and another small square.
 - Horizontal distance from left edge to central square center: 0.0170 (0.432)
 - Horizontal distance between central and right squares: 0.0220 (0.559)
 - Vertical distance from top edge to central square center: 0, 0.11
- Central square features:
 - Width: 0.1040 (2.642)
 - Height: 0.1070 (2.718)
 - Horizontal centerline: 0, 0.03
 - Vertical centerline: 0, 0
- Bottom edge features:
 - Left to right: a small square, a central square with a horizontal centerline, and another small square.
 - Horizontal distance from left edge to central square center: 0.0170 (0.432)
 - Horizontal distance between central and right squares: 0.0380 (0.965)
 - Vertical distance from bottom edge to central square center: 0, -0.11

Other Dimensions:

- Bottom edge distance from left edge to central square center: 0.0500 (1.27)
- Bottom edge distance between central and right squares: 0.0380 (0.965)

Notes:

- 1

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1



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