



20-V N-Channel 1.8-V (G-S) MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
20	0.037 @ $V_{GS} = 4.5$ V	7.3
	0.039 @ $V_{GS} = 2.5$ V	7.1
	0.043 @ $V_{GS} = 1.8$ V	6.8

FEATURES

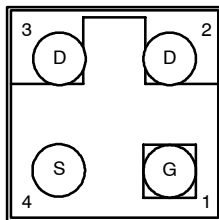
- TrenchFET® Power MOSFET
- New MICRO FOOT® Chipscale Packaging
Reduces Footprint Area Profile (0.62 mm) and
On-Resistance Per Footprint Area

APPLICATIONS

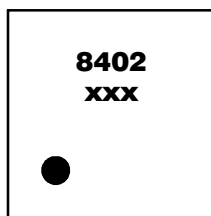
- PA, Battery and Load Switch for Portable Devices

MICRO FOOT

Bump Side View

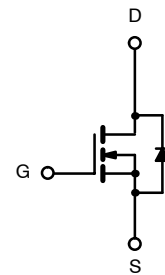


Backside View



Device Marking: 8402
xxx = Date/Lot Traceability Code

Ordering Information: Si8402DB-T1



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

Parameter		Symbol	5 secs	Steady State	Unit
Drain-Source Voltage		V _{DS}	20		V
Gate-Source Voltage		V _{GS}	± 8		
Continuous Drain Current (T _J = 150°C) ^a	T _A = 25°C	I _D	7.3	5.3	A
	T _A = 70°C		5.9	4.3	
Pulsed Drain Current		I _{DM}	30		
continuous Source Current (Diode Conduction) ^a		I _S	2.3	1.2	
Maximum Power Dissipation ^a	T _A = 25°C	P _D	2.77	1.47	W
	T _A = 70°C		1.77	0.94	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	−55 to 150		°C
Package Reflow Conditions ^b	VPR		215		
	IR/Convection		220		

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^a	$t \leq 5$ sec	R_{thJA}	35	45	$^\circ\text{C}/\text{W}$
	Steady State		72	85	
Maximum Junction-to-Foot (drain)	Steady State	R_{thJF}	16	20	

Notes

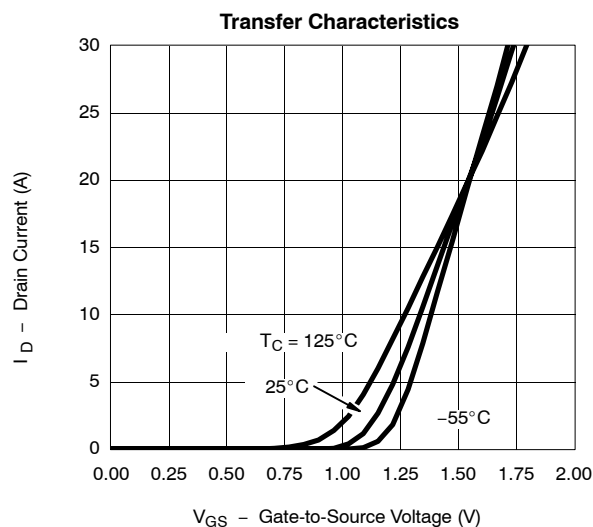
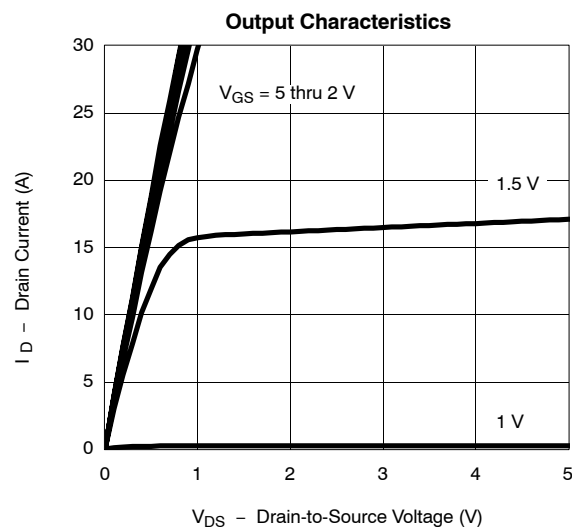
- a. Surface Mounted on 1" x 1" FR4 Board.
b. Refer to IPC/JEDEC (J-STD-020A), no manual or hand soldering.

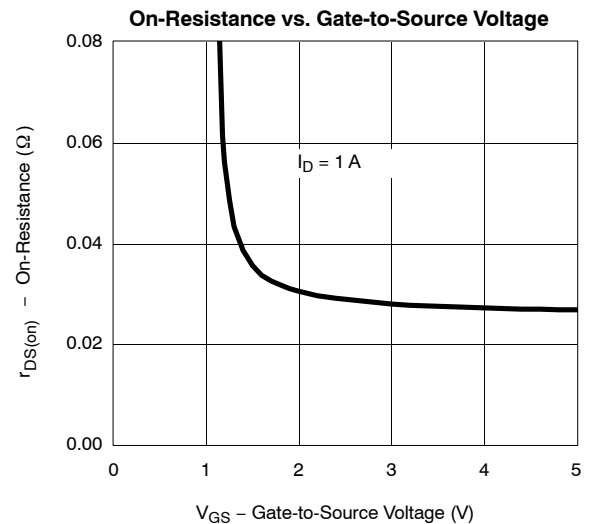
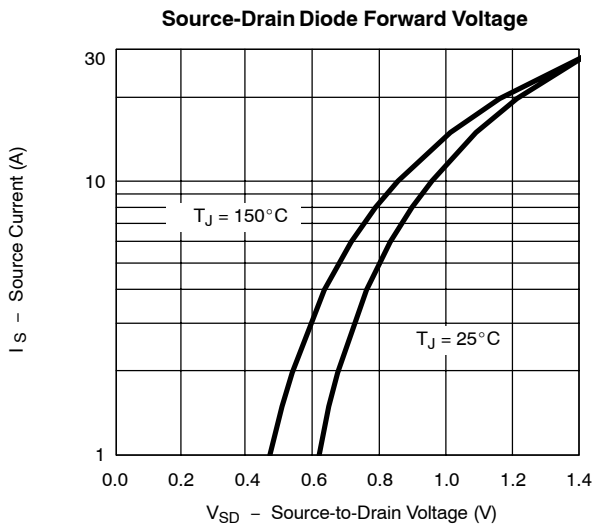
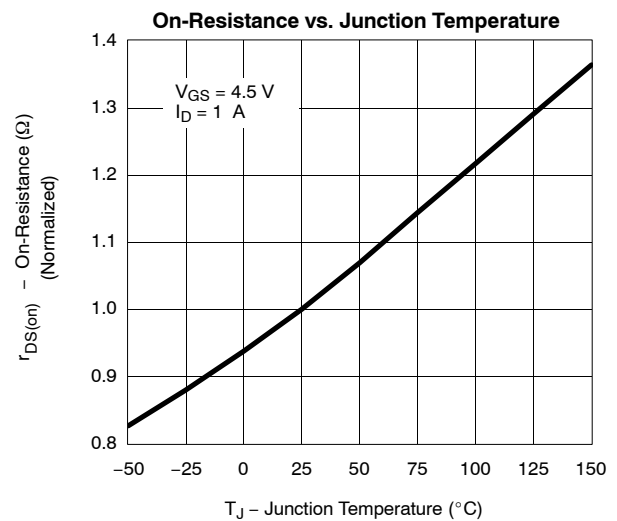
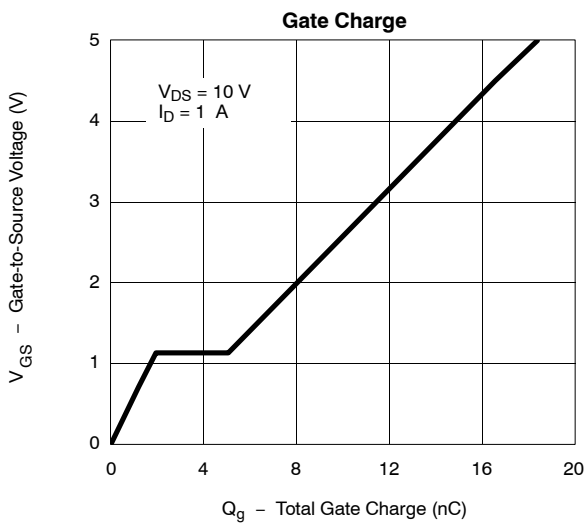
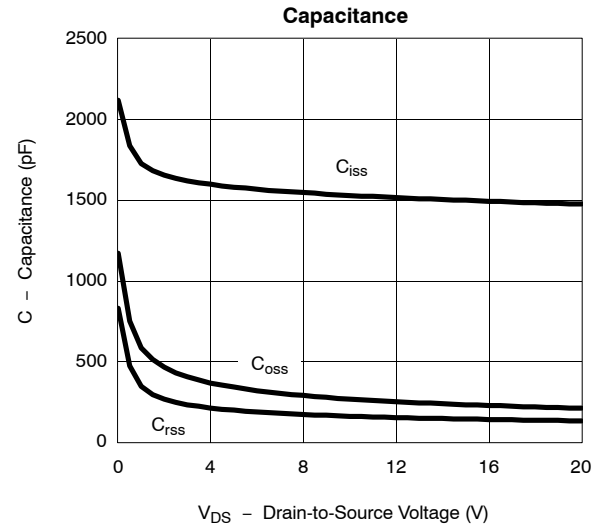
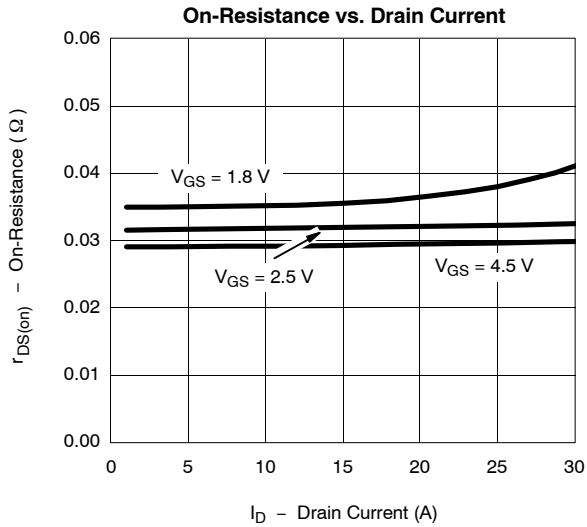
SPECIFICATIONS ($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

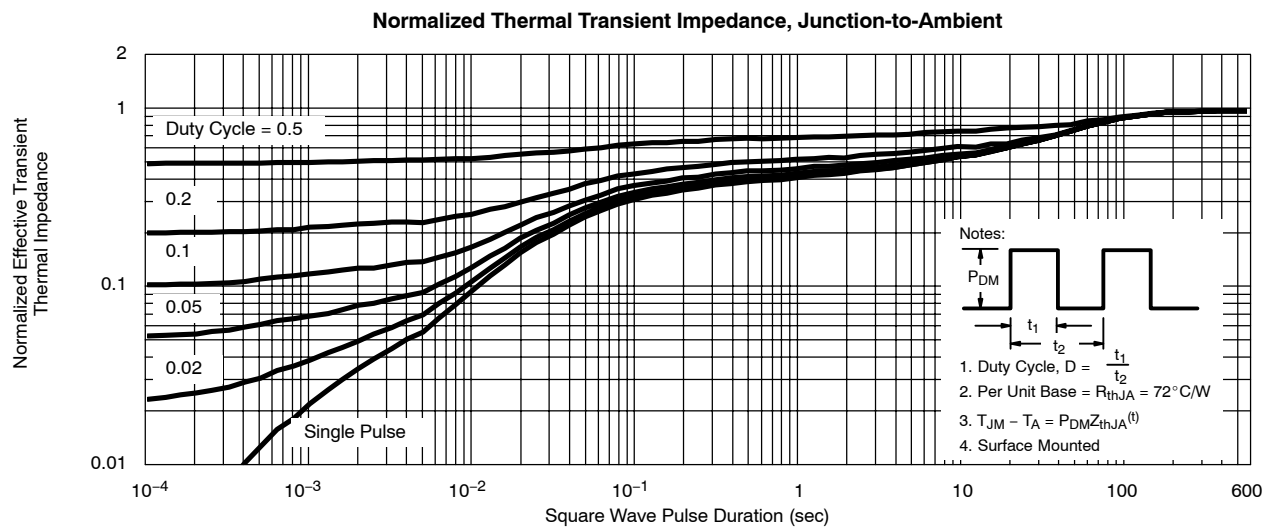
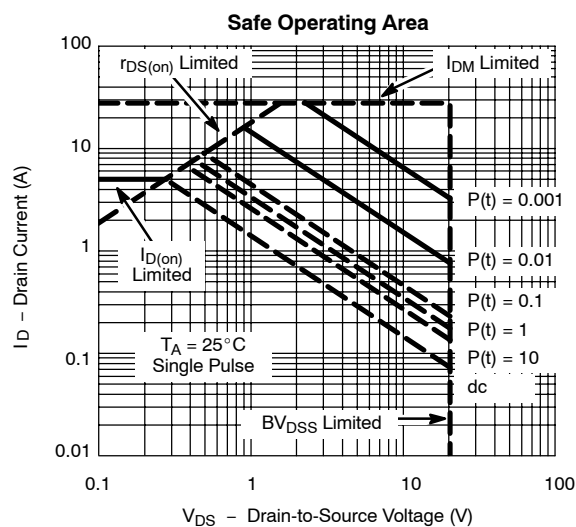
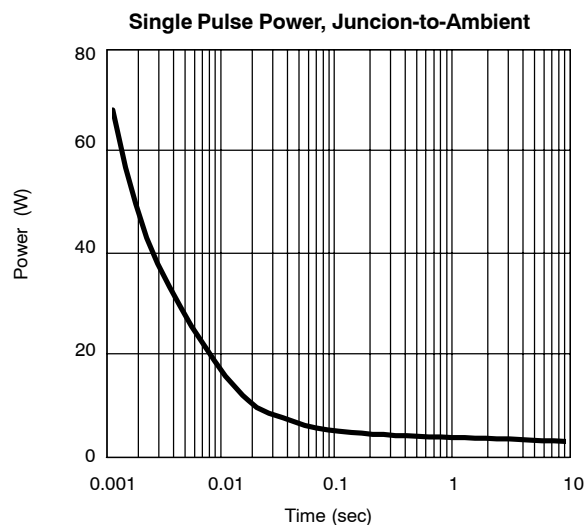
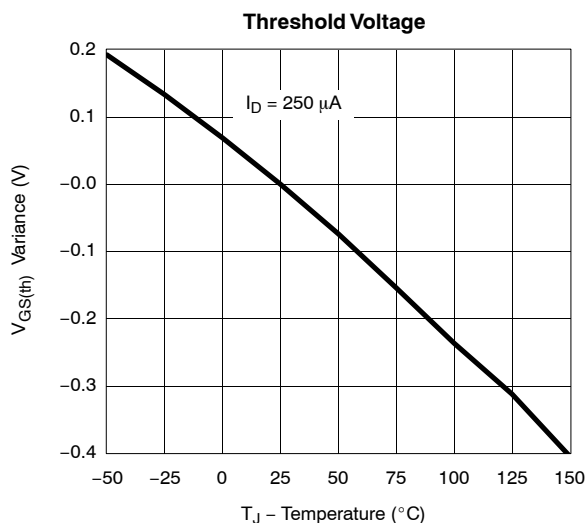
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{A}$	0.4		1.0	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\ \text{V}$, $V_{GS} = \pm 8\ \text{V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 20\ \text{V}$, $V_{GS} = 0\ \text{V}$			1	μA
		$V_{DS} = 20\ \text{V}$, $V_{GS} = 0\ \text{V}$, $T_J = 70^\circ\text{C}$			5	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq 5\ \text{V}$, $V_{GS} = 4.5\ \text{V}$	5			A
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = 4.5\ \text{V}$, $I_D = 1\ \text{A}$		0.031	0.037	Ω
		$V_{GS} = 2.5\ \text{V}$, $I_D = 1\ \text{A}$		0.033	0.039	
		$V_{GS} = 1.8\ \text{V}$, $I_D = 1\ \text{A}$		0.035	0.043	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 10\ \text{V}$, $I_D = 1\ \text{A}$		12		S
Diode Forward Voltage ^a	V_{SD}	$I_S = 1\ \text{A}$, $V_{GS} = 0\ \text{V}$		0.8	1.2	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = 10\ \text{V}$, $V_{GS} = 4.5\ \text{V}$, $I_D = 1\ \text{A}$		17	26	nC
Gate-Source Charge	Q_{gs}			2		
Gate-Drain Charge	Q_{gd}			3.1		
Gate Resistance	R_g	$f = 1\ \text{MHz}$		15		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10\ \text{V}$, $R_L = 10\ \Omega$ $I_D \approx 1\ \text{A}$, $V_{GEN} = 4.5\ \text{V}$, $R_g = 6\ \Omega$		30	45	ns
Rise Time	t_r			45	70	
Turn-Off Delay Time	$t_{d(off)}$			145	220	
Fall Time	t_f			75	115	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 1\ \text{A}$, $di/dt = 100\ \text{A}/\mu\text{s}$		30	60	

Notes

- a. Pulse test; pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

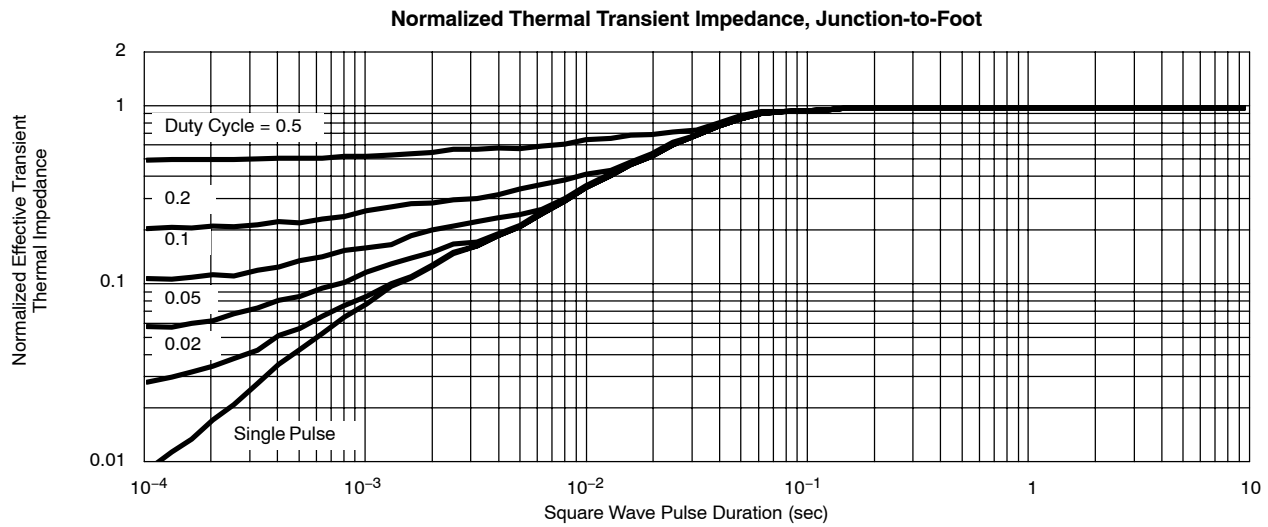
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

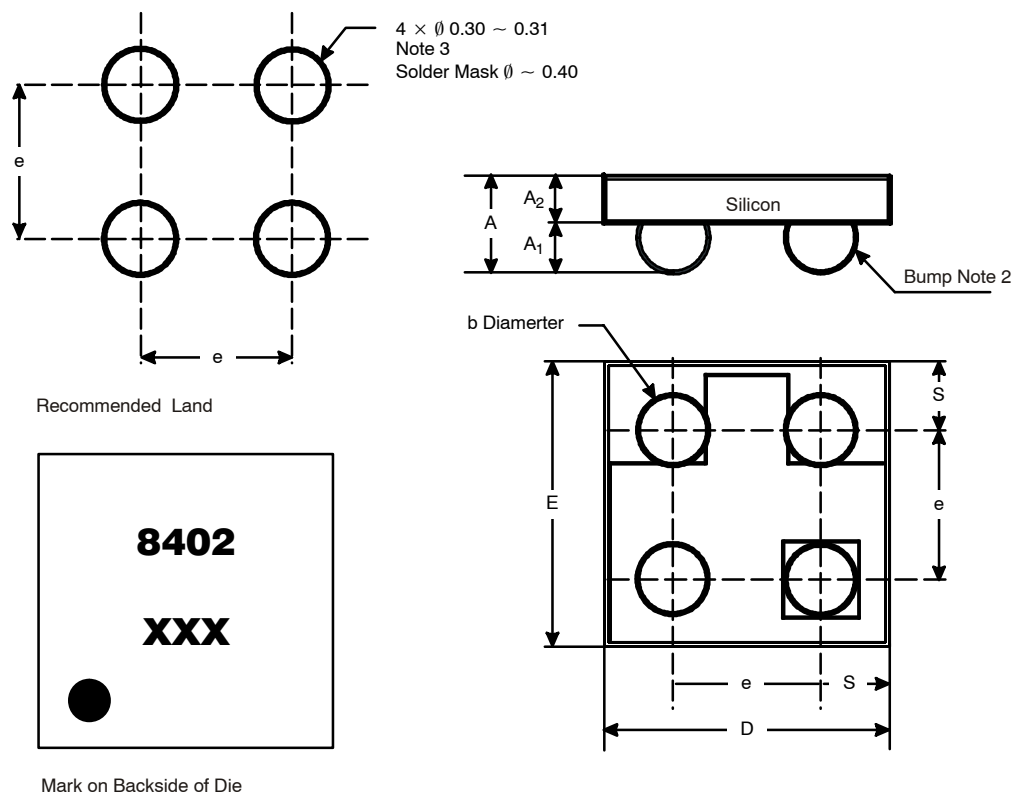
**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**

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PACKAGE OUTLINE
MICRO FOOT: 4-BUMP (2 X 2, 0.8-mm PITCH)

NOTES (Unless Otherwise Specified):

5. Laser mark on the silicon die back, coated with a thin metal.
6. Bumps are Eutectic solder 63/57 Sn/Pb.
7. Non-solder mask defined copper landing pad.
8. The flat side of wafers is oriented at the bottom.

Dim	MILLIMETERS*		INCHES	
	Min	Max	Min	Max
A	0.600	0.650	0.0236	0.0256
A ₁	0.260	0.290	0.0102	0.0114
A ₂	0.340	0.360	0.0134	0.0142
b	0.370	0.410	0.0146	0.0161
D	1.520	1.600	0.0598	0.0630
E	1.520	1.600	0.0598	0.0630
e	0.750	0.850	0.0295	0.0335
S	0.370	0.380	0.0146	0.0150

* Use millimeters as the primary measurement.