P-Channel 20-V (D-S) MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
−20	0.065 @ V_{GS} = −4.5 V	−4.9
	0.095 @ V_{GS} = −2.5 V	−4.1

FEATURES

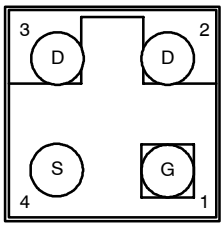
- TrenchFET® Power MOSFET
- New MICRO FOOT® Chipscale Packaging Reduces Footprint Area Profile (0.62 mm) and On-Resistance Per Footprint Area
- Pin Compatible to Industry Standard Si3443DV

APPLICATIONS

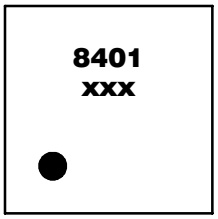
- PA, Battery and Load Switch
- Battery Charger Switch
- PA Switch

MICRO FOOT

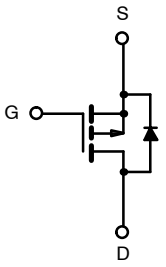
Bump Side View



Backside View



Device Marking: 8401
xxx = Date/Lot Traceability Code



P-Channel MOSFET

Ordering Information: Si8401DB-T1
Si8401DB-T1—E3 (Lead Free)

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)

Parameter		Symbol	5 secs	Steady State	Unit
Drain-Source Voltage		V_{DS}	−20		V
Gate-Source Voltage		V_{GS}	±12		
Continuous Drain Current (T_J = 150°C)[a]	T_A = 25°C	I_D	−4.9	−3.6	A
	T_A = 70°C		−3.9	−2.8	
Pulsed Drain Current		I_{DM}	−10		
continuous Source Current (Diode Conduction)[a]		I_S	−2.5	−2.5	
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		215/245[c]		°C
	IR/Convection		220/250[c]		

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient[a]	t ≤ 5 sec	R_{thJA}	35	45	°C/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.
c. Package reflow conditions for lead-free.

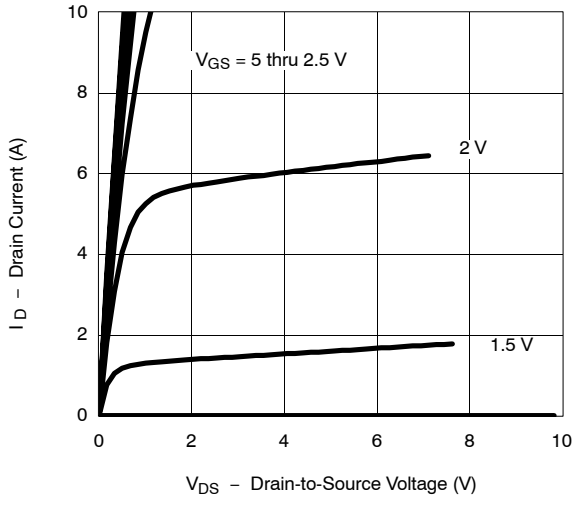
SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = −250 μA	−0.45	−0.9		V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±12 V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = −20 V, V_{GS} = 0 V			−1	μA
		V_{DS} = −20 V, V_{GS} = 0 V, T_J = 70°C			−5	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} ≤ −5 V, V_{GS} = −4.5 V	−5			A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = −4.5 V, I_D = −1 A		0.057	0.065	Ω
		V_{GS} = −2.5 V, I_D = −1 A		0.080	0.095	
Forward Transconductance[a]	g_{fs}	V_{DS} = −10 V, I_D = −1 A		6		S
Diode Forward Voltage[a]	V_{SD}	I_S = −1 A, V_{GS} = 0 V		−0.73	−1.1	V
Dynamic[b]						
Total Gate Charge	Q_g	V_{DS} = −10 V, V_{GS} = −4.5 V, I_D = −1 A		11	17	nC
Gate-Source Charge	Q_{gs}			2.1		
Gate-Drain Charge	Q_{gd}			2.9		
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = −10 V, R_L = 10 Ω I_D ≅ −1 A, V_{GEN} = −4.5 V, R_G = 6 Ω		17	25	ns
Rise Time	t_r			28	45	
Turn-Off Delay Time	$t_{d(off)}$			88	135	
Fall Time	t_f			60	90	
Source-Drain Reverse Recovery Time	t_{rr}	I_F = − A, di/dt = 100 A/μs				

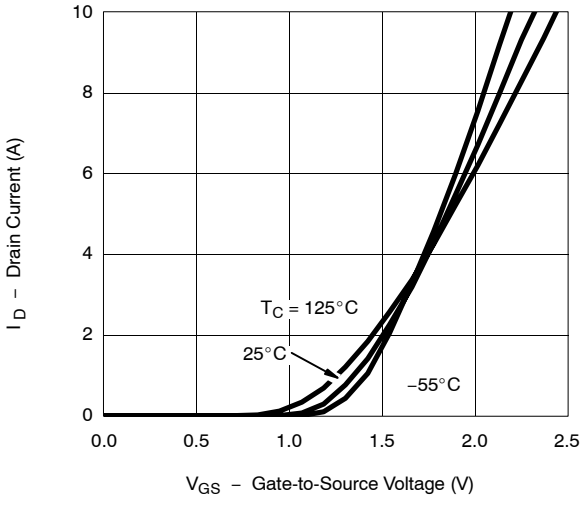
Notes
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

Output Characteristics

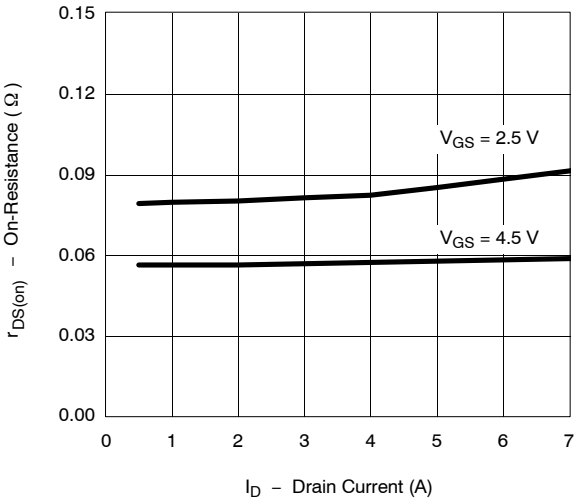


Transfer Characteristics

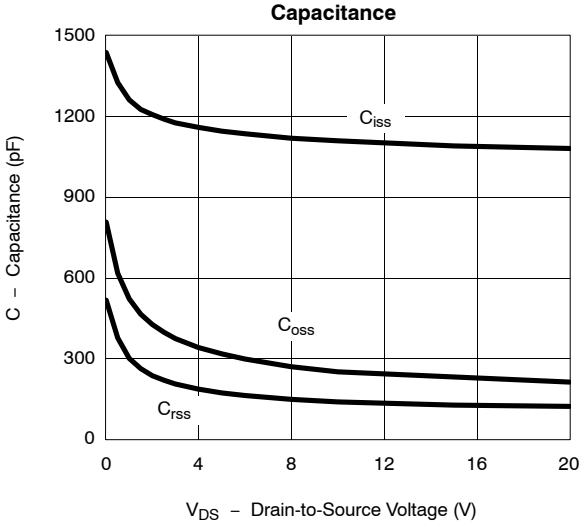


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

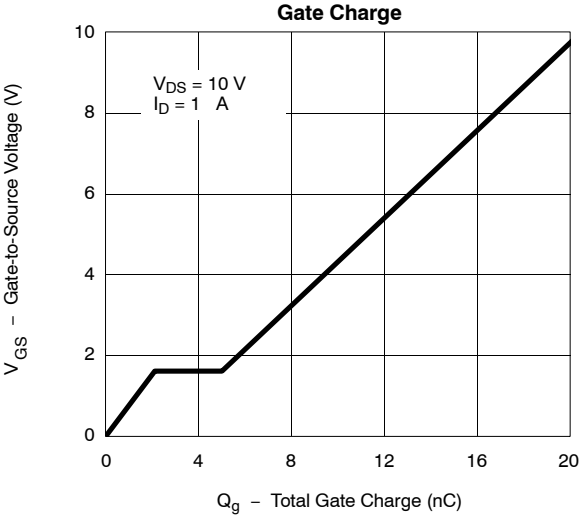
On-Resistance vs. Drain Current



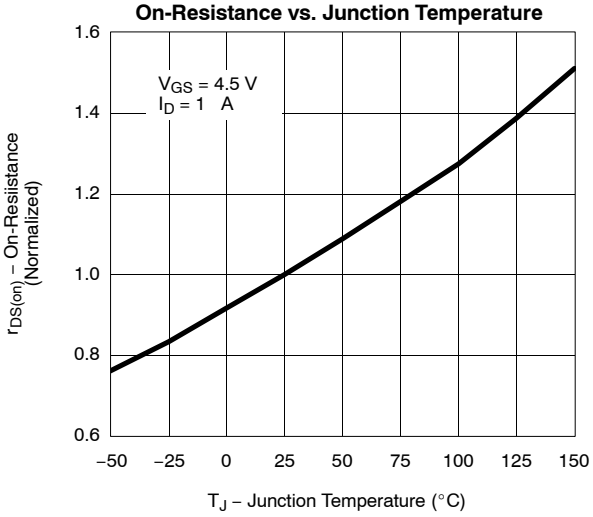
Capacitance



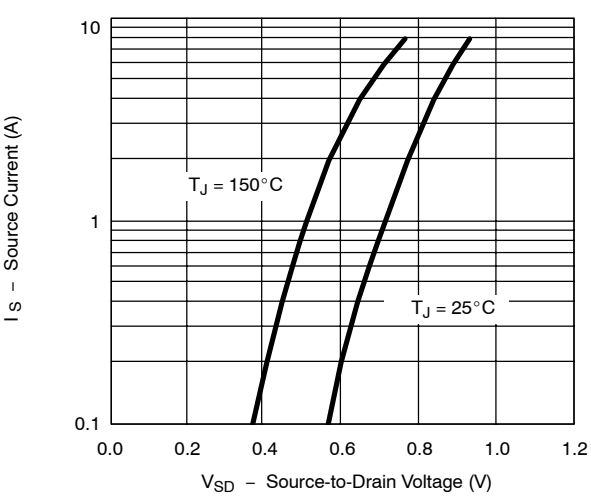
Gate Charge



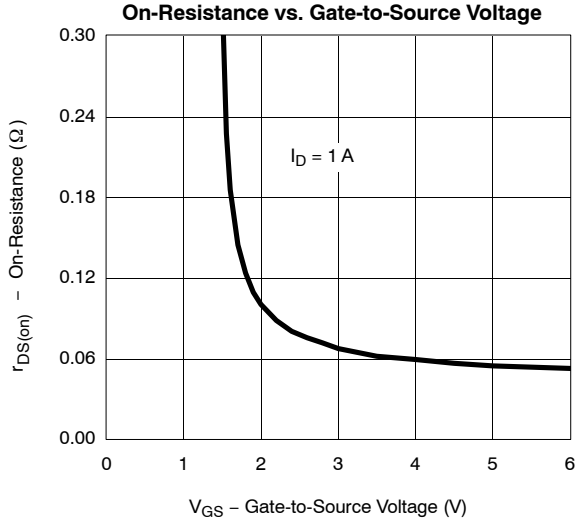
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

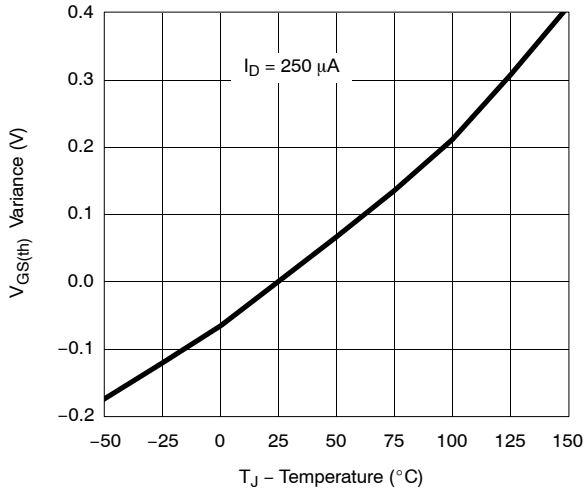


On-Resistance vs. Gate-to-Source Voltage

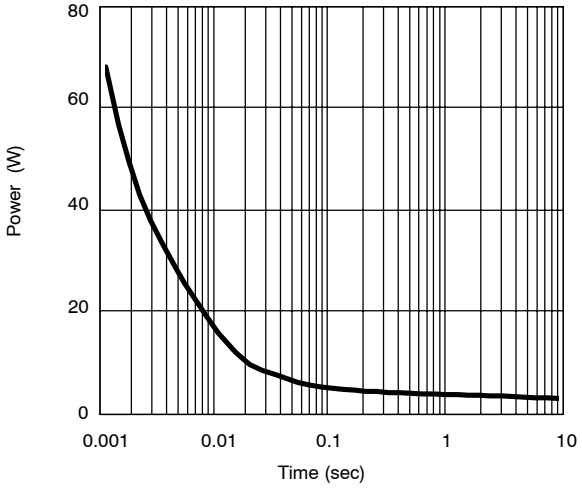


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

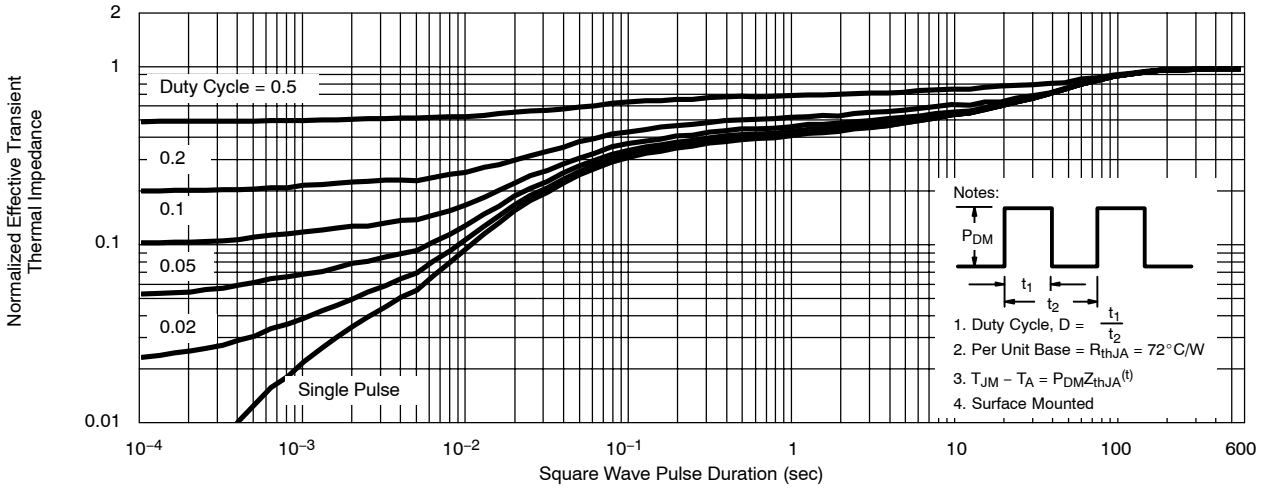
Threshold Voltage



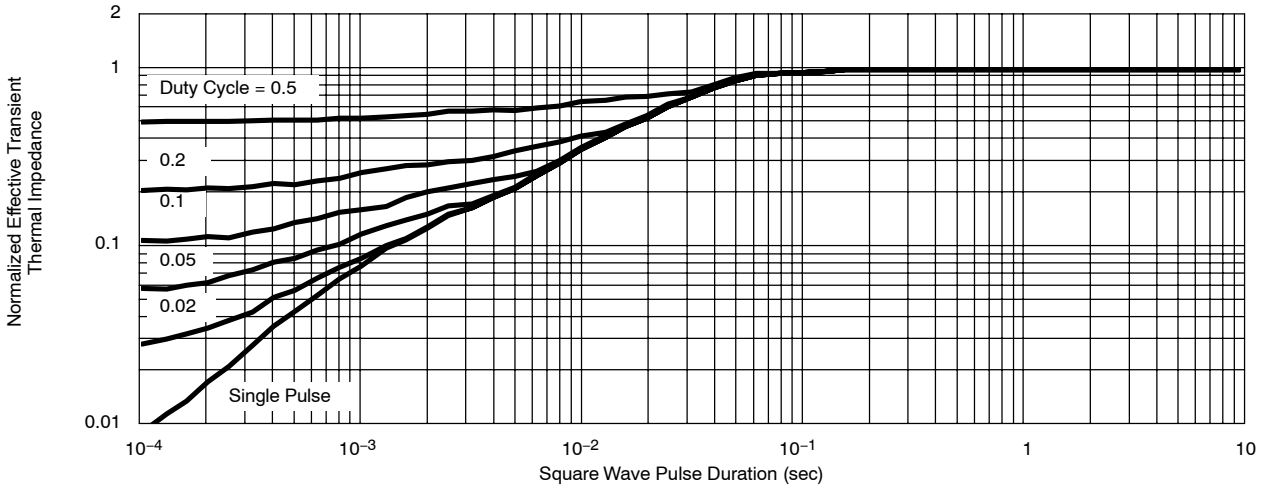
Single Pulse Power, Juncion-To-Ambient



Normalized Thermal Transient Impedance, Junction-to-Ambient



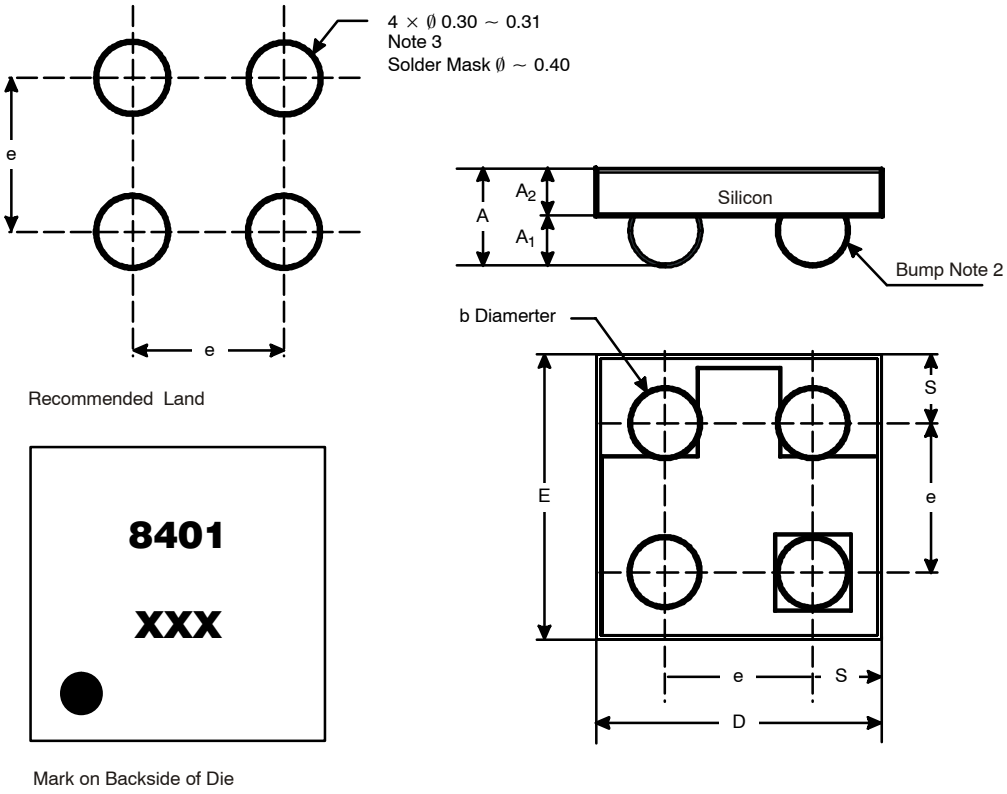
Normalized Thermal Transient Impedance, Junction-to-Foot



Document Number: 71674
S-40384—Rev. F, 01-Mar-04

PACKAGE OUTLINE

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



NOTES (Unless Otherwise Specified):

1. Laser mark on the silicon die back, coated with a thin metal.
2. Bumps are Eutectic solder 63/57 Sn/Pb. (Sn 3.8 Ag, 0.7 Cu for Pb-free bumps)
3. Non-solder mask defined copper landing pad.
4. 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.