



Description

The SI4401DY uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS} = -40V$ $I_D = -13A$

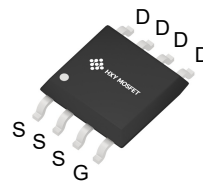
$R_{DS(ON)} < 19m\Omega$ @ $V_{GS}=10V$

Application

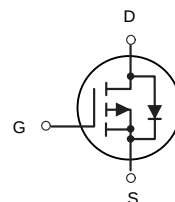
Battery protection

Load switch

Uninterruptible power supply



SOP-8



P-Channel MOSFET

Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
SI4401DY	SOP-8	HXY MOSFET	3000

Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	- 40	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_A=25^\circ C$	Drain Current ³ , V_{GS} @ 10V	-13	A
IDM	Pulsed Drain Current ¹	-52	A
$P_D@T_A=25^\circ C$	Total Power Dissipation	3	W
TSTG	Storage Temperature Range	-55 to 150	°C
TJ	Operating Junction Temperature Range	-55 to 150	°C
Rthj-a	Maximum Thermal Resistance, Junction-ambient ³	41	°C/W



Electrical Characteristics ($T_J = 25^\circ\text{C}$, unless otherwise noted)

Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics							
Drain-Source Breakdown Voltage		V _{(BR)DSS}	V _{GS} = 0V, I _D = -250μA	-40	-	-	V
Gate-body Leakage current		I _{GSS}	V _{DS} = 0V, V _{GS} = ±20V	-	-	±100	nA
Zero Gate Voltage Drain Current	T _J =25°C	I _{DSS}	V _{DS} = -40V, V _{GS} = 0V	-	-	-1	μA
	T _J =100°C			-	-	-100	
Gate-Threshold Voltage		V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-1.0	-1.5	-2.2	V
Drain-Source On-Resistance ⁴		R _{DS(on)}	V _{GS} = -10V, I _D = -10A	-	14.0	19	mΩ
			V _{GS} = -4.5V, I _D = -5 A	-	19.5	25	
Forward Transconductance ⁴		g _{fs}	V _{DS} = -10V, I _D = -10A	-	44	-	S
Dynamic Characteristics ⁵							
Input Capacitance		C _{iss}	V _{DS} = -20V, V _{GS} =0V, f =1MHz	-	2525	-	pF
Output Capacitance		C _{oss}		-	190	-	
Reverse Transfer Capacitance		C _{rss}		-	172	-	
Gate Resistance		R _g	f =1MHz	-	10	-	Ω
Switching Characteristics ⁵							
Total Gate Charge		Q _g	V _{GS} = -10V, V _{DS} = -20V, I _D = -10A	-	35	-	nC
Gate-Source Charge		Q _{gs}		-	5.5	-	
Gate-Drain Charge		Q _{gd}		-	8	-	
Turn-On Delay Time		t _{d(on)}	V _{GS} = -10V, V _{DD} = -20V, R _G = 3Ω, I _D = -10A	-	14.5	-	ns
Rise Time		t _r		-	20.2	-	
Turn-Off Delay Time		t _{d(off)}		-	32	-	
Fall Time		t _f		-	10	-	
Drain-Source Body Diode Characteristics							
Diode Forward Voltage ⁴		V _{SD}	I _S = -10A, V _{GS} = 0V	-	-	-1.2	V
Continuous Source Current	T _C =25°C	I _S	-	-	-	-13	A

Note :

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)} = 150^\circ\text{C}$.
2. The EAS data shows Max. rating . The test condition is $V_{DD} = -25V, V_{GS} = -10V, L = 0.1mH, I_{AS} = -34A$.
3. The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
5. This value is guaranteed by design hence it is not included in the production test.



Typical Characteristics

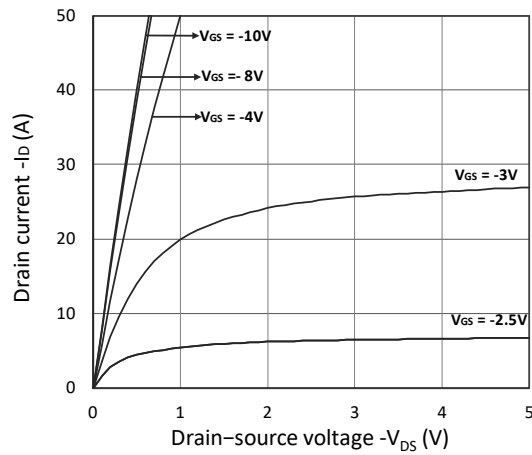


Figure 1. Output Characteristics

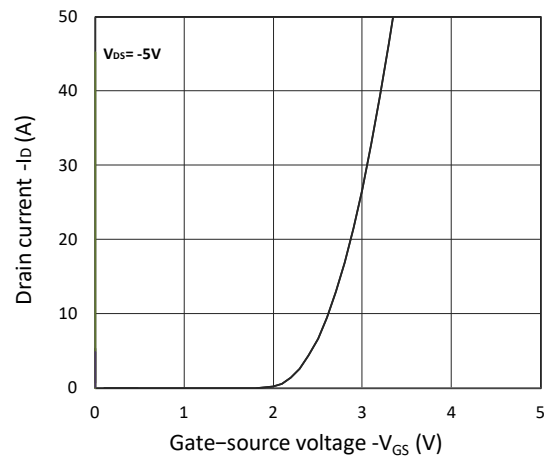


Figure 2. Transfer Characteristics

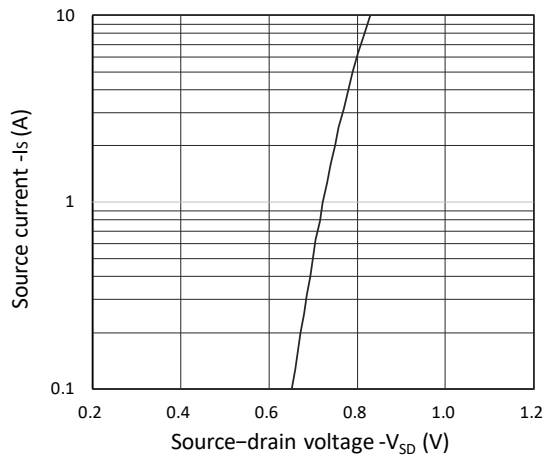


Figure 3. Forward Characteristics of Reverse

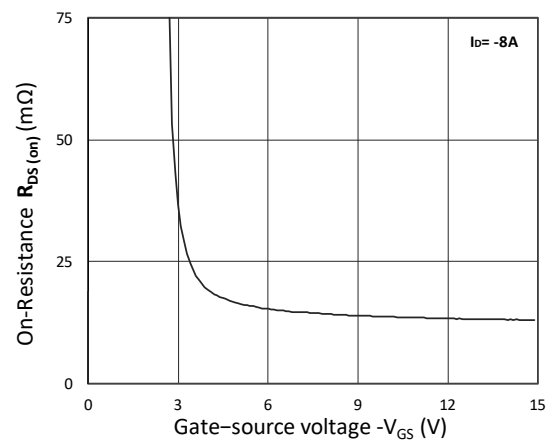


Figure 4. $R_{DS(on)}$ vs. V_{GS}

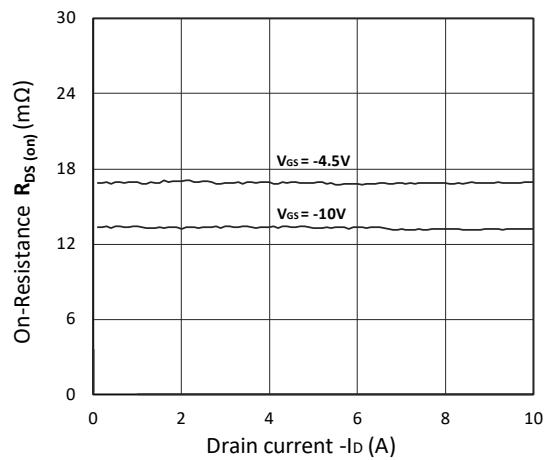


Figure 5. $R_{DS(on)}$ vs. I_D

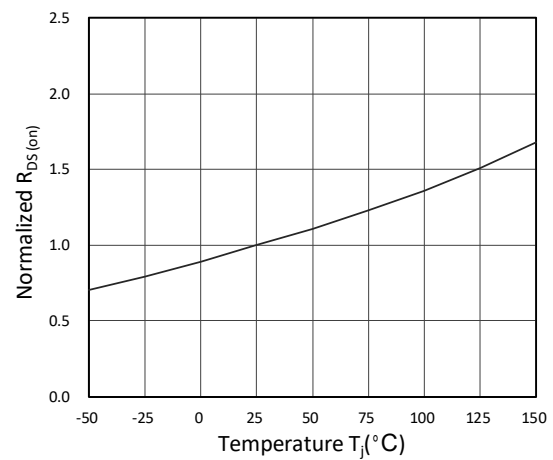


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

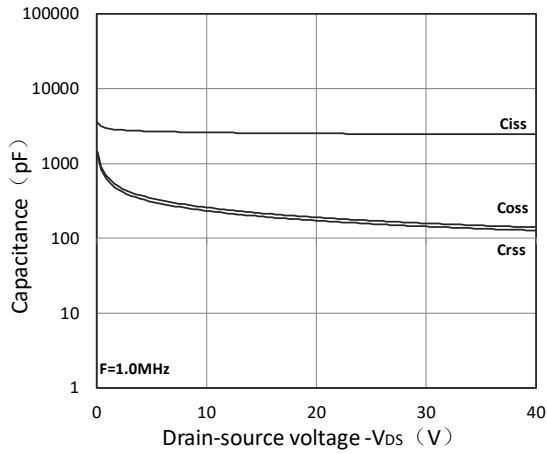


Figure 7. Capacitance Characteristics

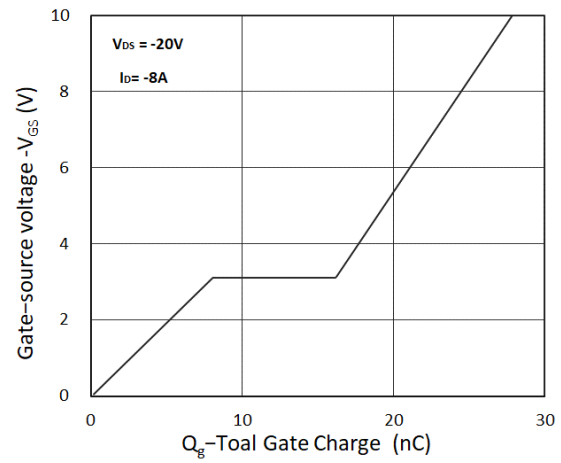


Figure 8. Gate Charge Characteristics

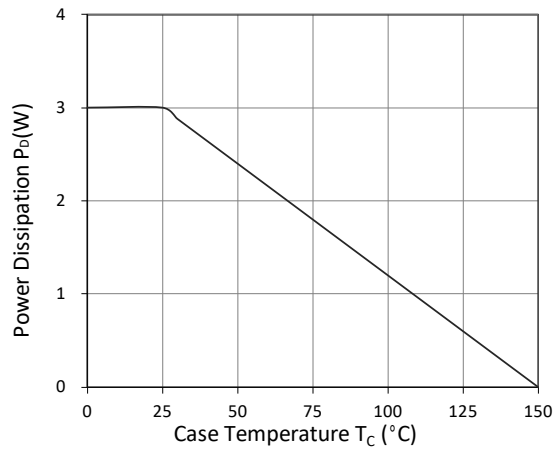


Figure 9. Power Dissipation

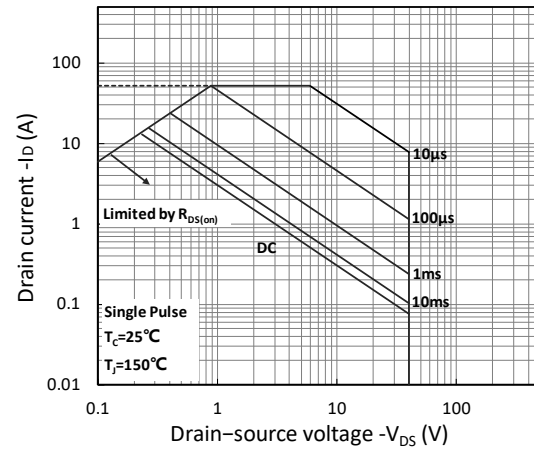


Figure 10. Safe Operating Area

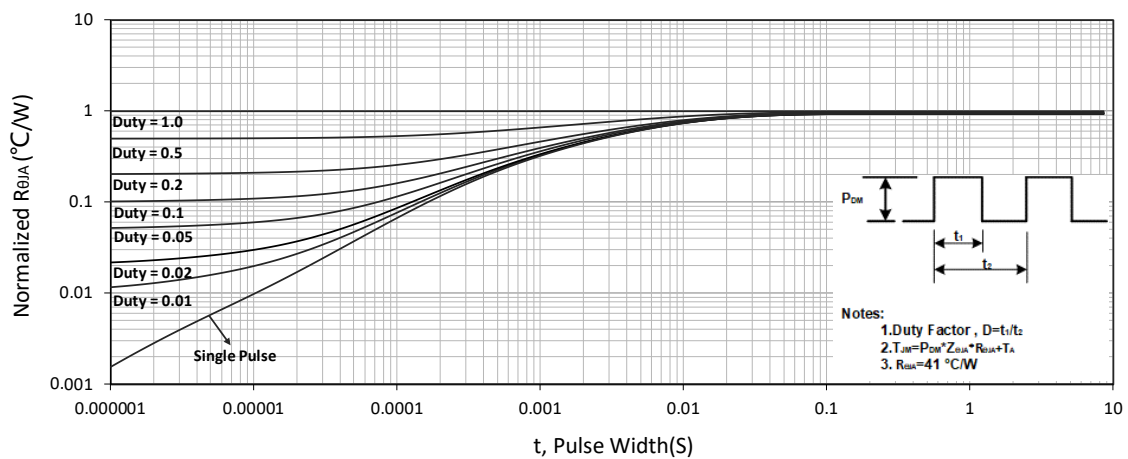


Figure 11. Normalized Maximum Transient Thermal Impedance



Test Circuit

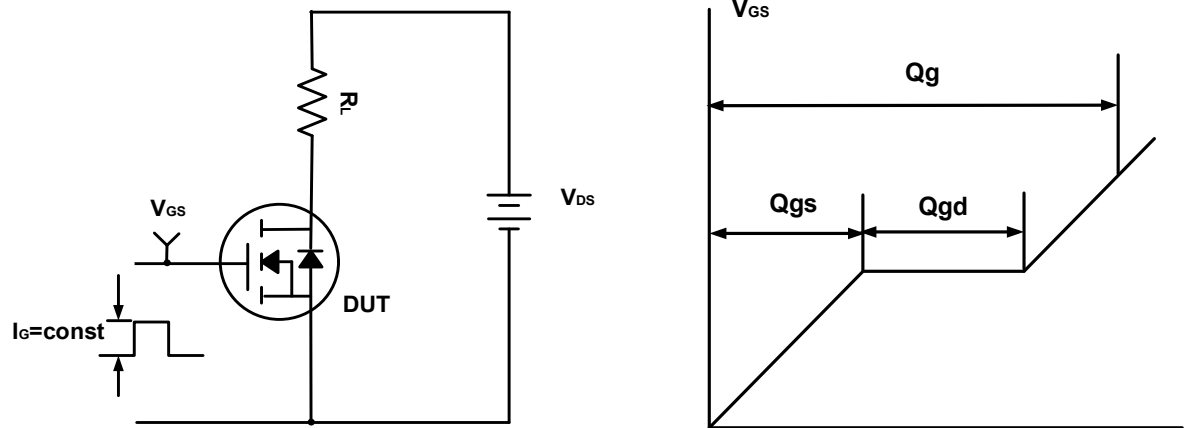


Figure A. Gate Charge Test Circuit & Waveforms

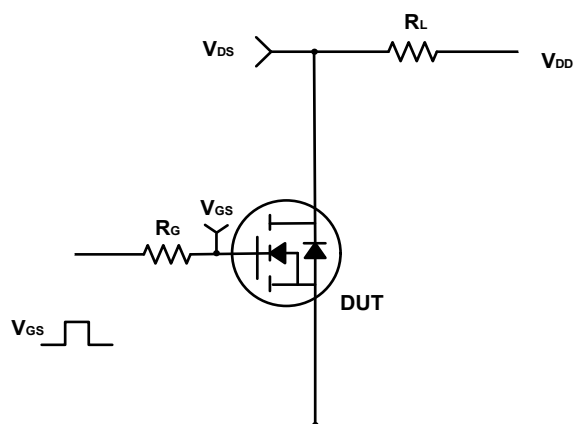


Figure B. Switching Test Circuit & Waveforms

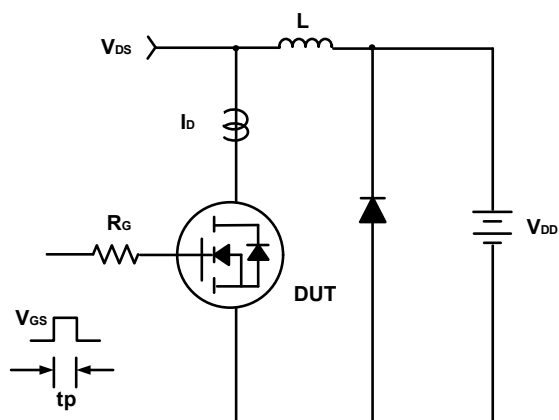
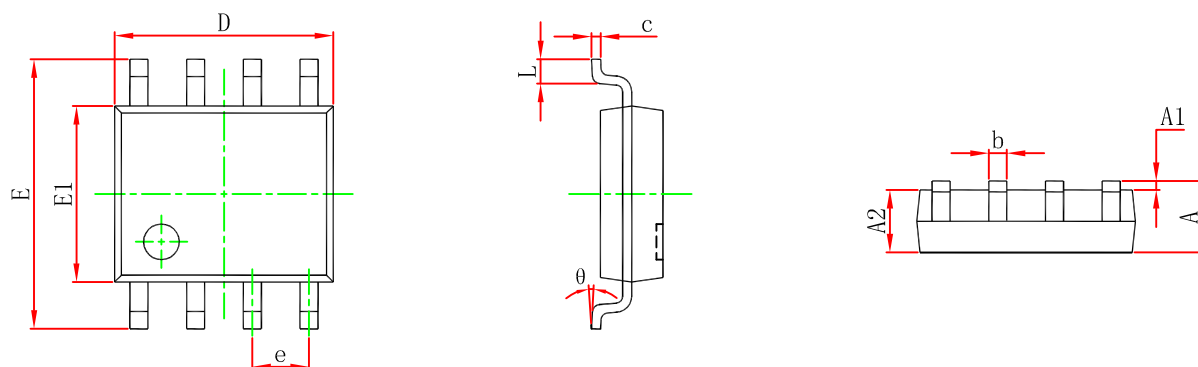


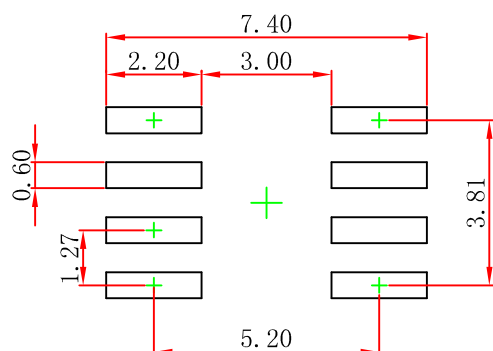
Figure C. Unclamped Inductive Switching Circuit & Waveforms



SOP-8 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270 (BSC)		0.050 (BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



Note:
1. Controlling dimension: in millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.



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