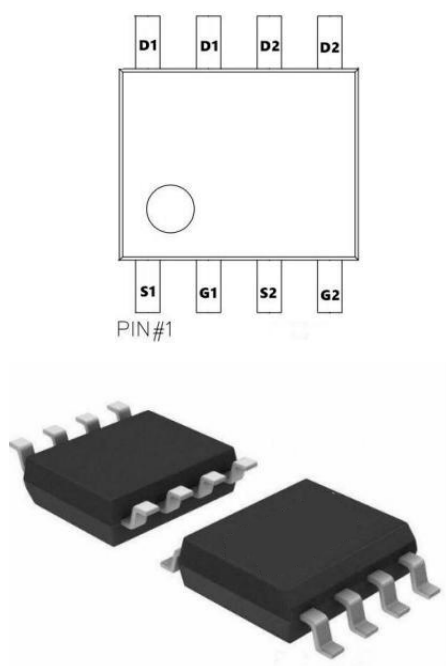


60V N+N-Channel Enhancement Mode MOSFET

Description

The SX6946A uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



General Features

$V_{DS} = 60V$ $I_D = 7.2A$

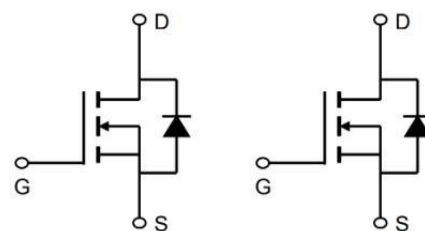
$R_{DS(ON)} < 35m\Omega$ @ $V_{GS}=10V$

Application

Battery protection

Load switch

Uninterruptible power supply



Absolute Maximum Ratings ($T_c=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_A=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	7.2	A
$I_D @ T_A=70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	4.8	A
I_{DM}	Pulsed Drain Current ²	14.6	A
E_{AS}	Single Pulse Avalanche Energy ³	21.5	mJ
I_{AS}	Avalanche Current	20.6	A
$P_D @ T_A=25^\circ C$	Total Power Dissipation ⁴	1.2	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	62.5	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	36	$^\circ C/W$

60V N+N-Channel Enhancement Mode MOSFET
Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V(BR)DSS	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	60	65	-	V
IDSS	Zero Gate Voltage Drain Current	$V_{DS}=60V, V_{GS}=0V,$	-	-	1.0	μA
IGSS	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	± 100	nA
VGS(th)	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.6	2.5	V
RDS(on)	Static Drain-Source on-Resistance note3	$V_{GS}=10V, I_D=10A$	-	28	35	m Ω
		$V_{GS}=4.5V, I_D=5A$	-	33	45	
Ciss	Input Capacitance	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0MHz$	-	1148	-	pF
Coss	Output Capacitance		-	58.5	-	pF
Crss	Reverse Transfer Capacitance		-	49.4	-	pF
Qg	Total Gate Charge	$V_{DS}=30V, I_D=10A,$ $V_{GS}=10V$	-	20.3	-	nC
Qgs	Gate-Source Charge		-	3.7	-	nC
Qgd	Gate-Drain("Miller") Charge		-	5.3	-	nC
td(on)	Turn-on Delay Time	$V_{DS}=30V, I_D=20A,$ $R_G=1.8\Omega, V_{GS}=10V$	-	7.6	-	ns
tr	Turn-on Rise Time		-	20	-	ns
td(off)	Turn-off Delay Time		-	15	-	ns
tr	Turn-off Fall Time		-	24	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	20	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	80	A
VSD	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_S=20A$	-	-	1.2	V
trr	Body Diode Reverse Recovery Time	$I_F=20A, dI/dt=100A/\mu s$	-	29	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	43	-	nC

Notes:

- 1、Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
- 2、EAS condition : $T_J=25^{\circ}\text{C}$, $V_{DD}=30V$, $V_G=10V$, $L=0.5mH$, $R_G=25\Omega$, $I_{AS}=8.5A$
- 3、Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Typical Characteristics

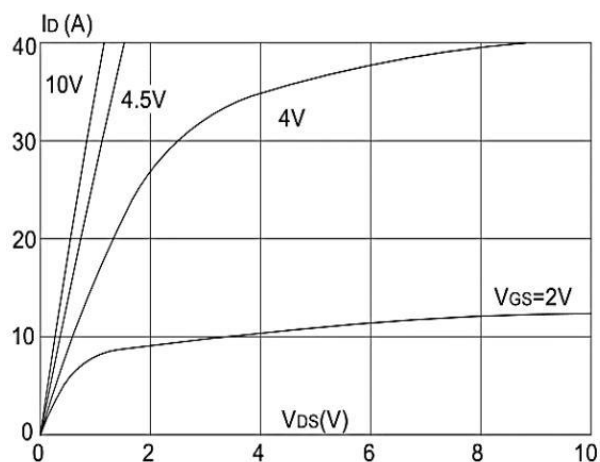


Figure1: Output Characteristics

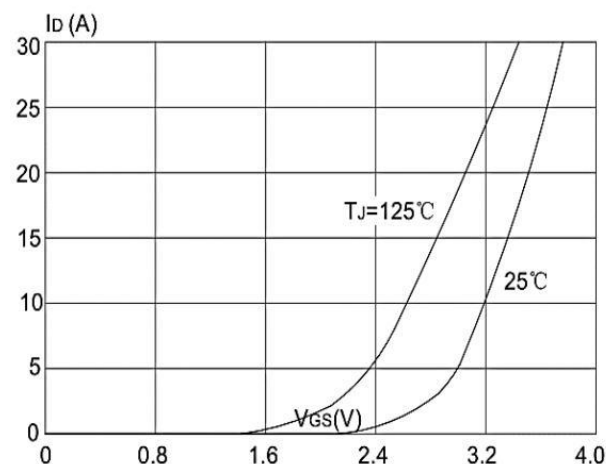


Figure 2: Typical Transfer Characteristics

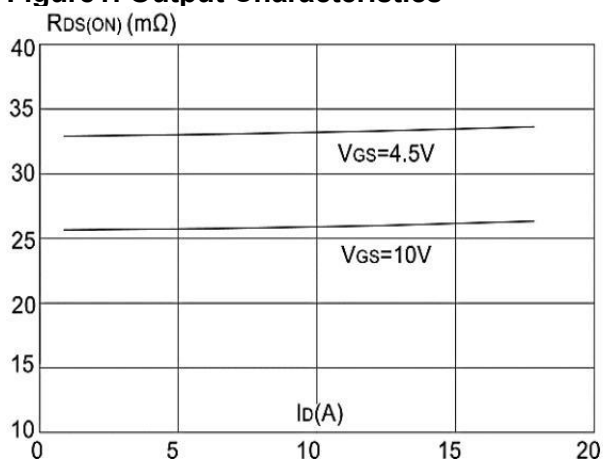


Figure 3: On-resistance vs. Drain Current

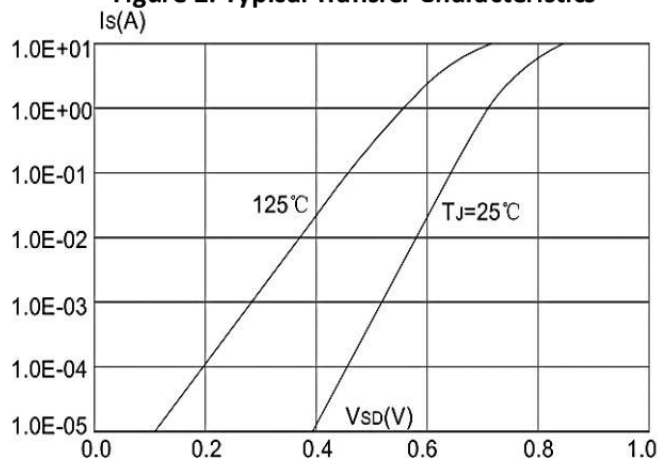


Figure 4: Body Diode Characteristics

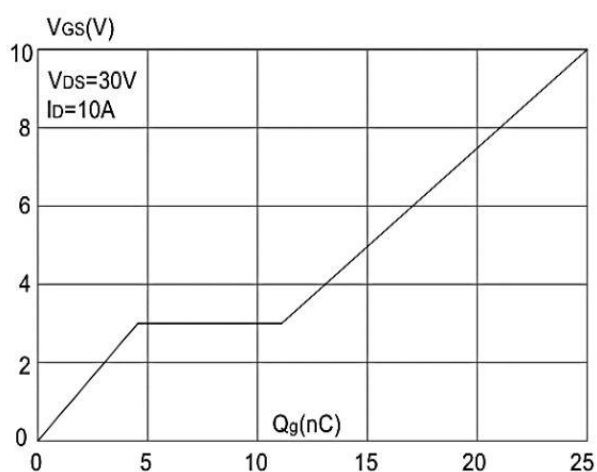


Figure 5: Gate Charge Characteristics

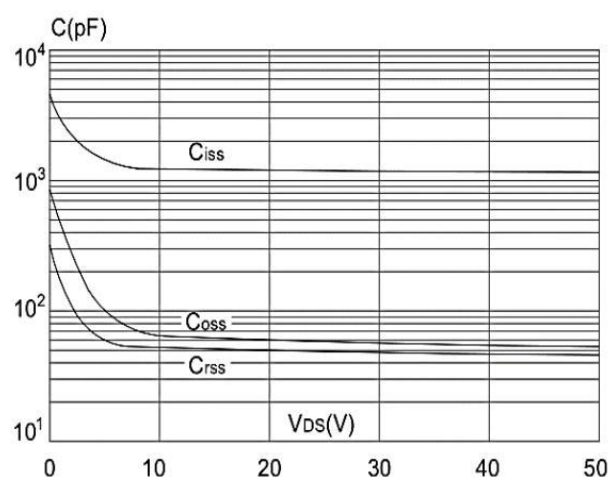


Figure 6: Capacitance Characteristics

Typical Characteristics

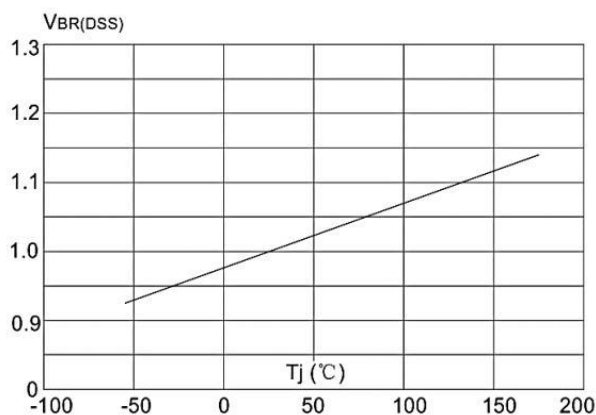


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

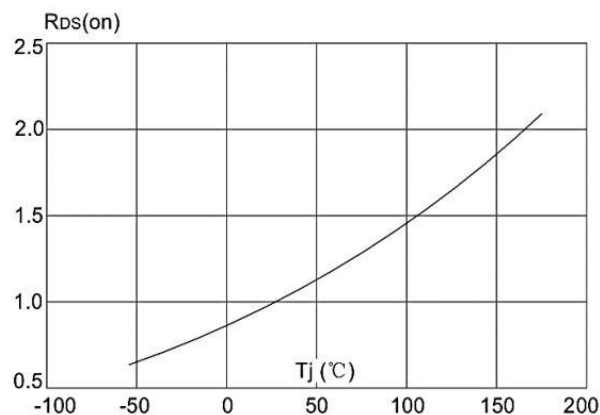


Figure 8: Normalized on Resistance vs. Junction Temperature

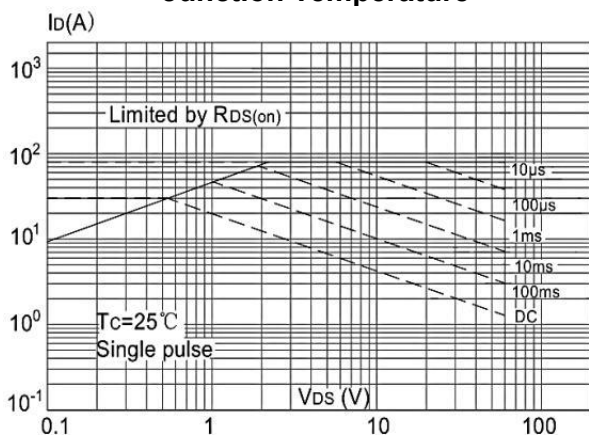


Figure 9: Maximum Safe Operating Area vs. Case Temperature

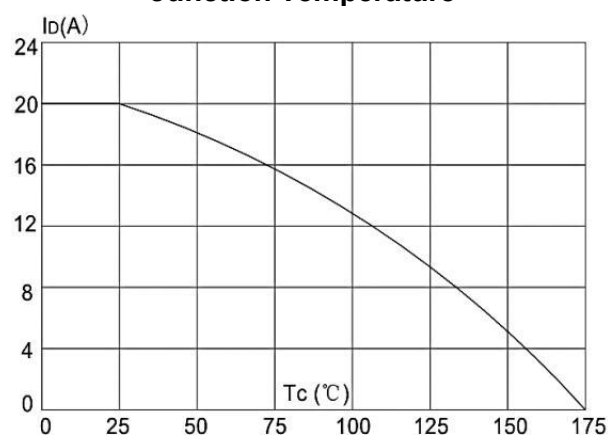


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

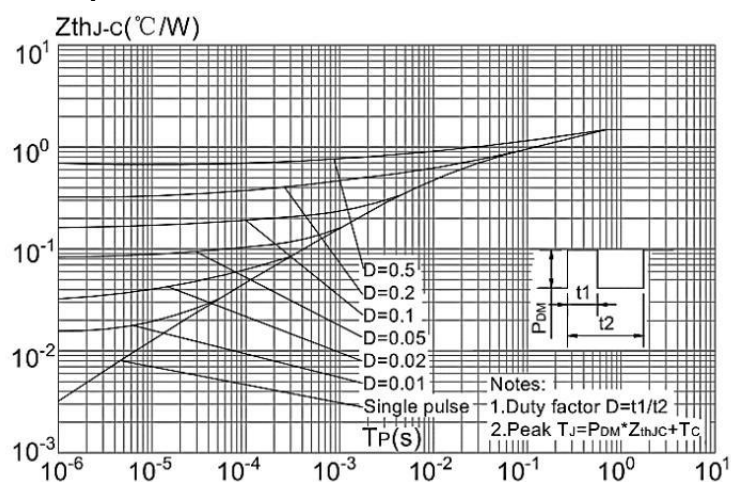
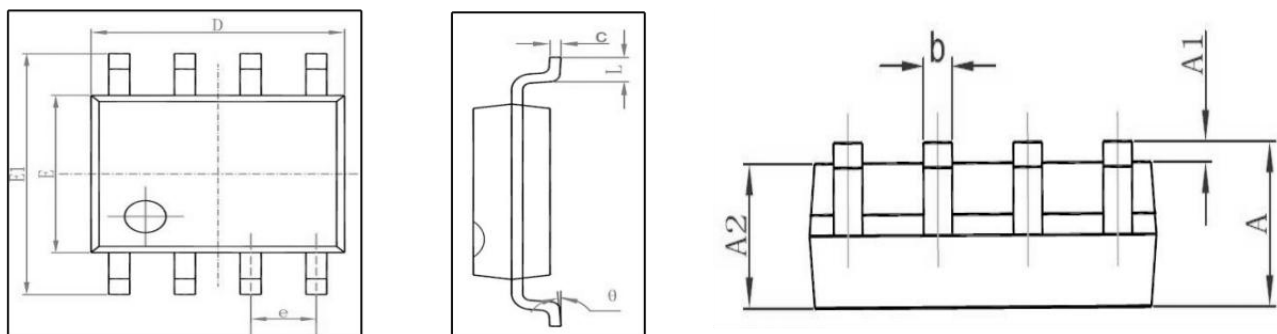
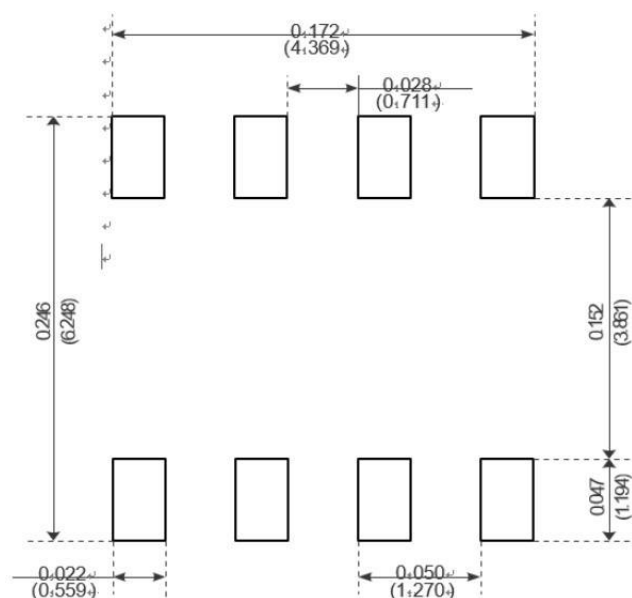


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

Package Mechanical Data-SOP-8


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	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°


Recommended Minimum Pads
Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
TAPING	SOP-8		3000