ALPHA & OMEGA SEMICONDUCTOR

AO4944

Dual N-Channel Enhancement Mode Field Effect Transistor

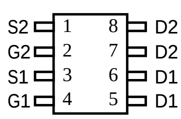
SRFET **TM**

General Description

SRFETTM The AO4944 uses advanced trench technology with a monolithically integrated Schottky diode to provide excellent $R_{DS(ON)}$ and low gate charge. This device is suitable for use as a low and high side switch in SMPS and general purpose applications. Standard product *AO4944 is Pb-free (meets ROHS & Sony 259 specifications)*.

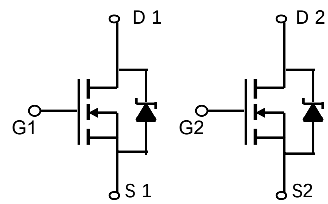
Features

V_{DS} (V) = 30V
I_D = 8.6A (V$_{GS}$ = 10V)
$R_{DS(ON)}$ < 16mΩ (V_{GS} = 10V)
$R_{DS(ON)}$ < 20mΩ (V_{GS} = 4.5V)



SOIC-8

SRFETTM
Soft **R**ecovery MOS**FET**:
Integrated Schottky Diode



Absolute Maximum Ratings T_A=25°C unless otherwise noted				
Parameter		**Symbol**	**Maximum**	**Units**
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±12	V
Continuous Drain Current AF	T_A=25°C	I_D	8.6	A
	T_A=70°C		6.9	
Pulsed Drain Current B		I_{DM}	40	
Avalanche Current B		I_{AR}	16	A
Repetitive avalanche energy L=0.3mH B		E_{AR}	38	mJ
Power Dissipation	T_A=25°C	P_D	2	W
	T_A=70°C		1.3	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Thermal Characteristics					
Parameter		**Symbol**	**Typ**	**Max**	**Units**
Maximum Junction-to-Ambient A	t ≤ 10s	$R_{\theta JA}$	48	62.5	°C/W
Maximum Junction-to-Ambient A	Steady-State		74	90	°C/W
Maximum Junction-to-Lead C	Steady-State	$R_{\theta JL}$	32	40	°C/W

Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions		Min	Typ	Max	Units
STATIC PARAMETERS							
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=250uA, V_{GS}=0V		30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=30V, V_{GS}=0V			0.01	0.1	mA
			T_J=125°C		5	10	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}= ±12V				0.1	µA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=250µA		1.5	1.8	2.4	V
$I_{D(ON)}$	On state drain current	V_{GS}=4.5V, V_{DS}=5V		40			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=8.6A			13	16	mΩ
			T_J=125°C		20	25	
		V_{GS}=4.5V, I_D=7A			16	20	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=8.6A			64		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V			0.4	0.6	V
I_S	Maximum Body-Diode + Schottky Continuous Current					4.5	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=15V, f=1MHz			1450	1885	pF
C_{oss}	Output Capacitance				224		pF
C_{rss}	Reverse Transfer Capacitance				92		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz			1.6	3.0	Ω
SWITCHING PARAMETERS							
Q_g(10V)	Total Gate Charge	V_{GS}=10V, V_{DS}=15V, I_D=8.6A			24	31	
Q_g(4.5V)	Total Gate Charge				12.0		nC
Q_{gs}	Gate Source Charge				3.9		nC
Q_{gd}	Gate Drain Charge				4.2		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=15V, R_L=1.7Ω, R_{GEN}=3Ω			5.5		ns
t_r	Turn-On Rise Time				4.7		ns
$t_{D(off)}$	Turn-Off DelayTime				24.0		ns
t_f	Turn-Off Fall Time				4.0		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=8.6A, dI/dt=300A/µs			10	12	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=8.6A, dI/dt=300A/µs			6.8		nC

A:The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2_{OZ}. Copper, in a still air environment with T_A =25°C. The value in any given application depends on the user's specific board design.
B: Repetitive rating, pulse width limited by junction temperature.
C: The R $_{\theta JA}$ is the sum of the thermal impedence from junction to lead R $_{\theta JL}$ and lead to ambient.
D: The static characteristics in Figures 1 to 6 are obtained using <300 us pulses, duty cycle 0.5% max.
E: These tests are performed with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The SOA curve provides a single pulse rating.
F: The current rating is based on the t<=10s junction to ambient thermal resistance rating.
Rev0:December 2006

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

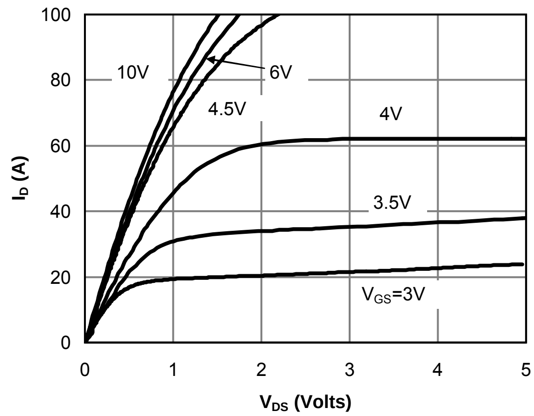


Figure 1: On-Region Characteristics

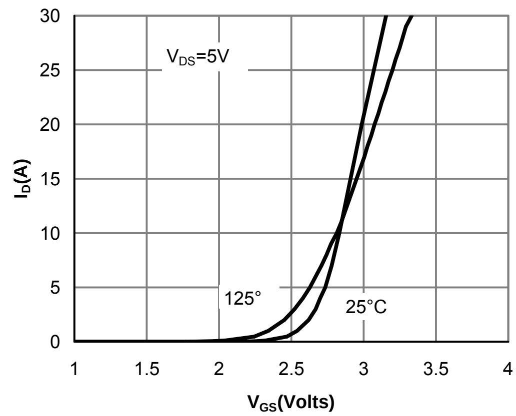


Figure 2: Transfer Characteristics

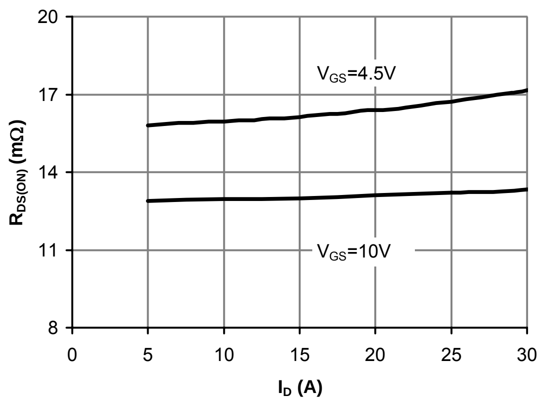


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

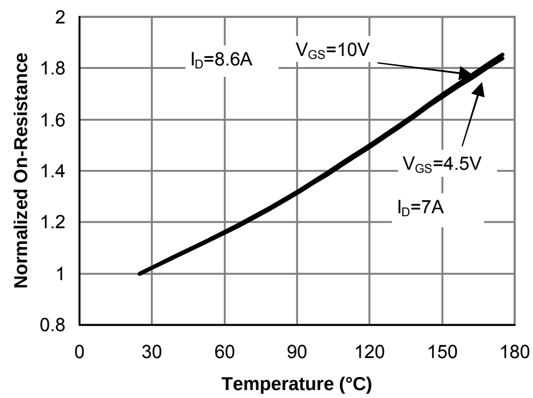


Figure 4: On-Resistance vs. Junction Temperature

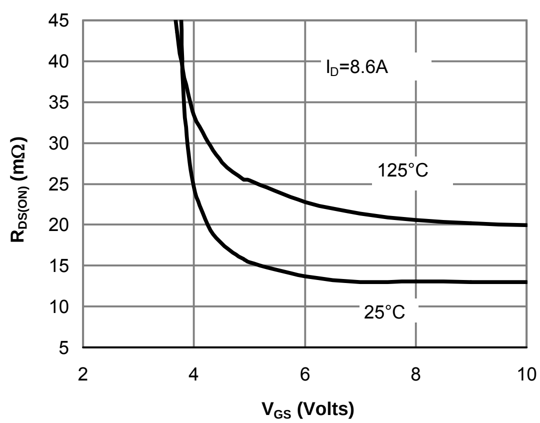


Figure 5: On-Resistance vs. Gate-Source Voltage

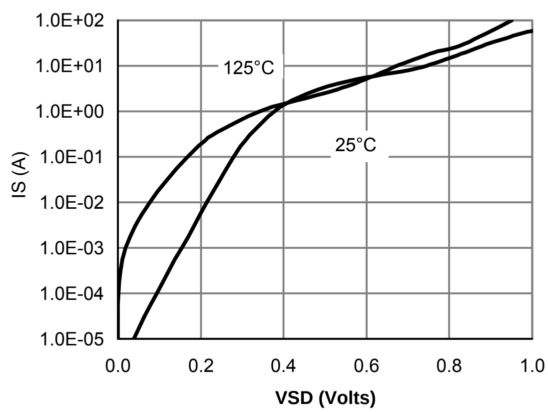


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

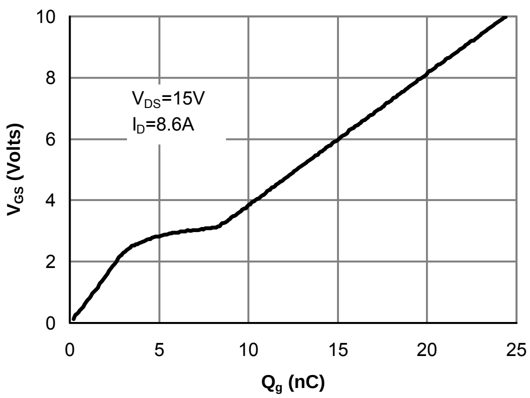


Figure 7: Gate-Charge Characteristics

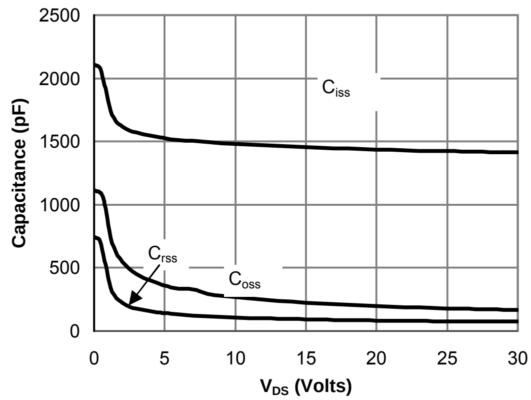


Figure 8: Capacitance Characteristics

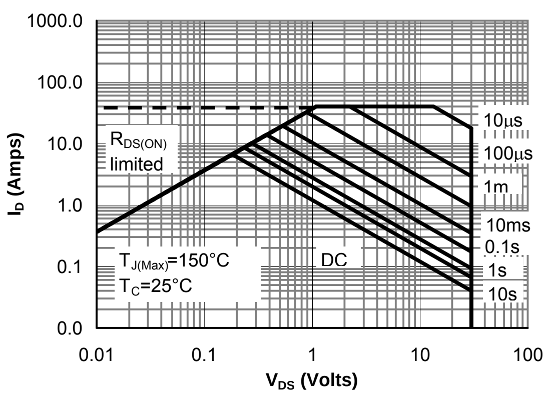


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

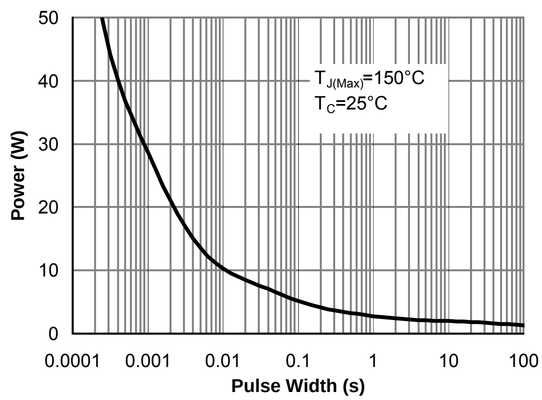


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

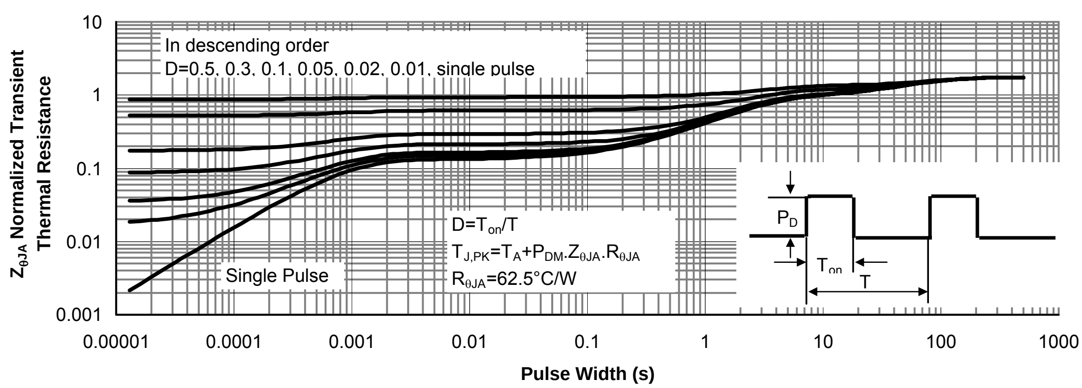


Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

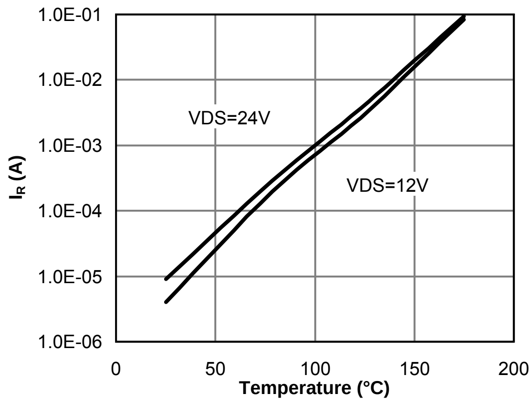


Figure 12: Diode Reverse Leakage Current vs. Junction Temperature

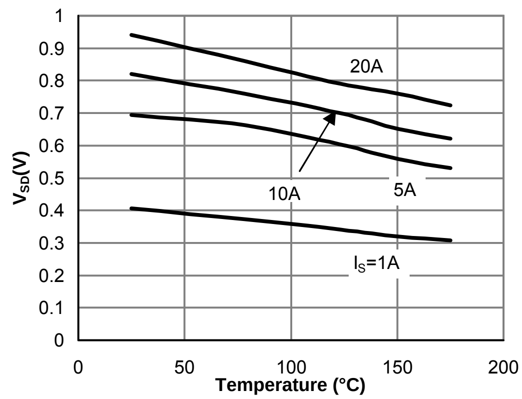


Figure 13: Diode Forward voltage vs. Junction Temperature

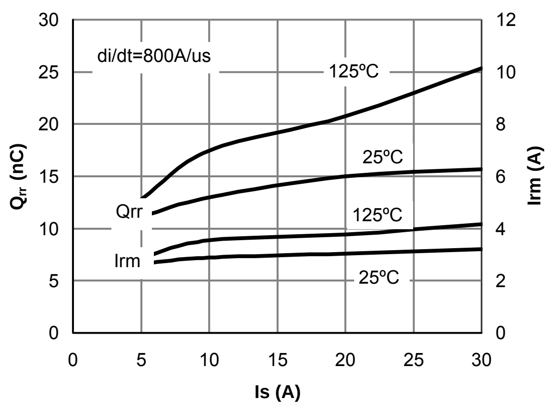


Figure 14: Diode Reverse Recovery Charge and Peak Current vs. Conduction Current

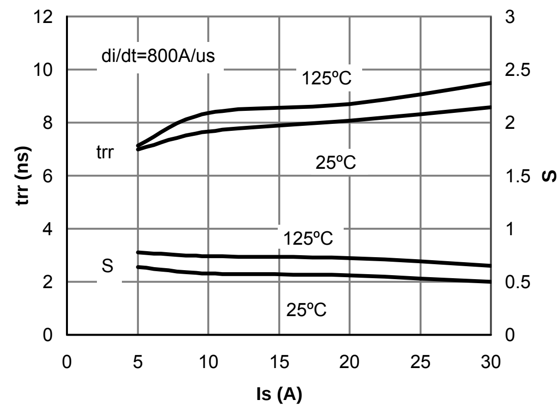


Figure 15: Diode Reverse Recovery Time and Soft Coefficient vs. Conduction Current

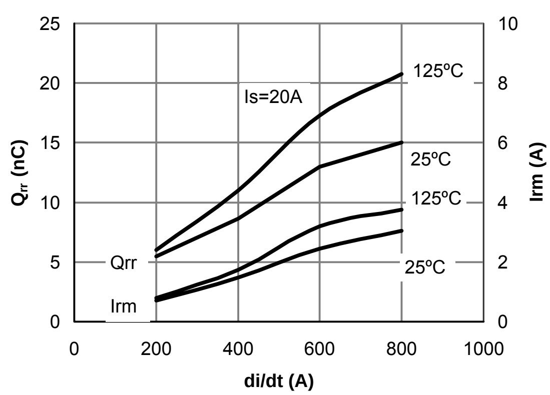


Figure 16: Diode Reverse Recovery Charge and Peak Current vs. di/dt

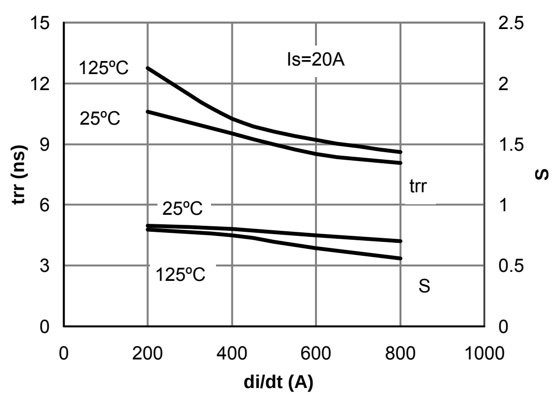


Figure 17: Diode Reverse Recovery Time and Soft Coefficient vs. di/dt