ALPHA & OMEGA SEMICONDUCTOR

AO5803E
Dual P-Channel Enhancement Mode Field Effect Transistor

General Description

The AO5803E/L uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge, and operation with gate voltages as low as 1.8V, in the small SC89-6L footprint. It can be used as load switching, and wide variety of FET applications. AO5803E and AO5803EL are electrically identical.

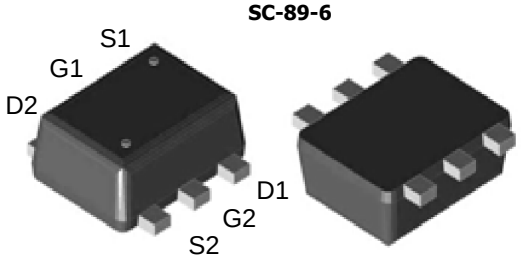
-RoHS compliant
-AO5803EL is Halogen Free

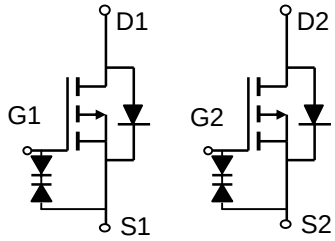
Features

V_{DS} (V) = -20V
I_D = -0.6A (V_{GS} = -4.5V)
$R_{DS(ON)}$ < 0.8Ω (V_{GS} = -4.5V)
$R_{DS(ON)}$ < 1.0Ω (V_{GS} = -2.5V)
$R_{DS(ON)}$ < 1.25Ω (V_{GS} = -1.8V)

ESD PROTECTED

SC-89-6





Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	-20	V
Gate-Source Voltage		V_{GS}	±8	V
Continuous Drain Current [A, F]	T_A=25°C	I_D	-0.6	A
	T_A=70°C		-0.4	
Pulsed Drain Current [B]		I_{DM}	-3	
Power Dissipation [A]	T_A=25°C	P_D	0.4	W
	T_A=70°C		0.24	
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	$R_{\theta JA}$	275	330	°C/W
Maximum Junction-to-Ambient [A]	Steady-State		360	450	°C/W
Maximum Junction-to-Lead [C]	Steady-State	$R_{\theta JL}$	300	350	°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=-250µA, V_{GS}=0V		-20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-20V, V_{GS}=0V				-1	µA
			T_J=55°C			-5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±4.5V				±1	µA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=-250µA		-0.4	-0.5	-0.9	V
$I_{D(ON)}$	On state drain current	V_{GS}=-4.5V, V_{DS}=-5V		-3			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-4.5V, I_D=-0.6A			0.62	0.8	Ω
			T_J=125°C		0.87	1.1	
		V_{GS}=-2.5V, I_D=-0.5A			0.79	1	Ω
		V_{GS}=-1.8V, I_D=-0.4A			0.96	1.25	Ω
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-0.6A			0.9		S
V_{SD}	Diode Forward Voltage	I_S=-0.1A,V_{GS}=0V			-0.81	-1	V
I_S	Maximum Body-Diode Continuous Current					-0.5	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-10V, f=1MHz			72	100	pF
C_{oss}	Output Capacitance				17		pF
C_{rss}	Reverse Transfer Capacitance				9		pF
SWITCHING PARAMETERS							
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=-4.5V, V_{DS}=-10V, R_L=16.7Ω, R_{GEN}=3Ω			60.5		ns
t_r	Turn-On Rise Time				150		ns
$t_{D(off)}$	Turn-Off DelayTime				612		ns
t_f	Turn-Off Fall Time				436		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=-0.6A, dI/dt=100A/µs, V_{GS}=-9V			27	35	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=-0.6A, dI/dt=100A/µs, V_{GS}=-9V			8.3		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. 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 µs 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 thermal resistance rating.
Rev 4: July 2011

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

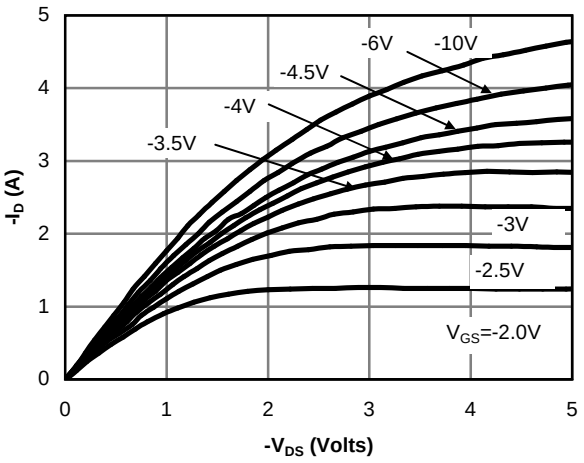


Figure 1: On-Region Characteristics

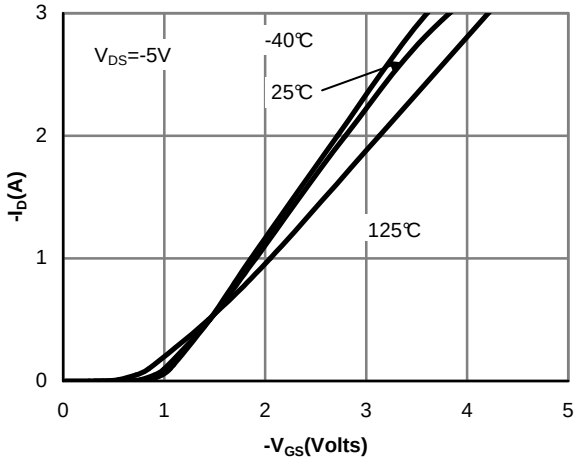


Figure 2: Transfer Characteristics

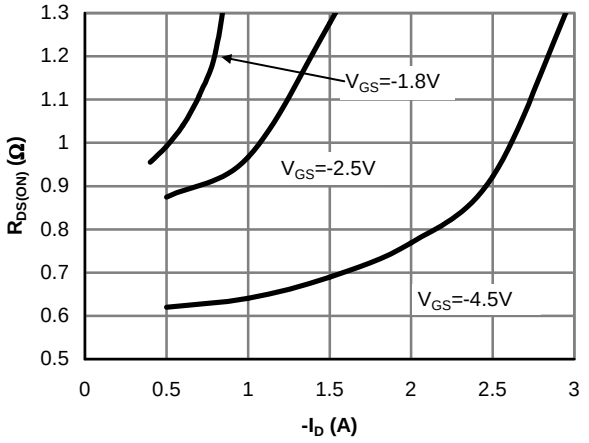


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

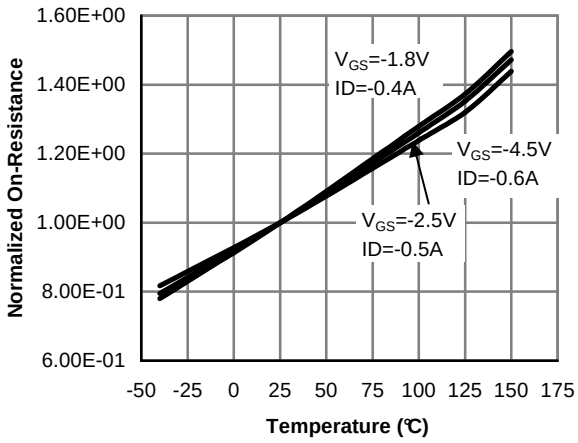


Figure 4: On-Resistance vs. Junction Temperature

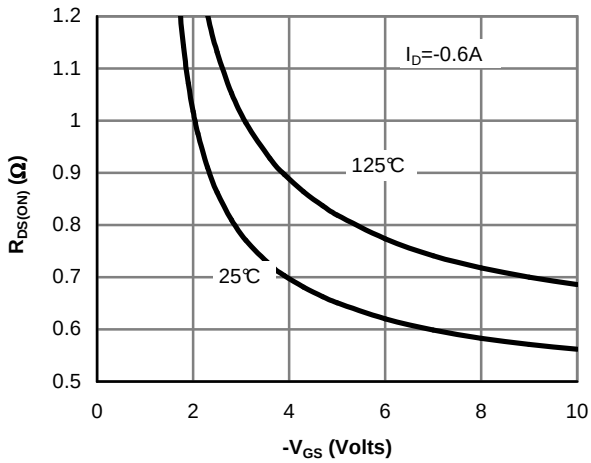


Figure 5: On-Resistance vs. Gate-Source Voltage

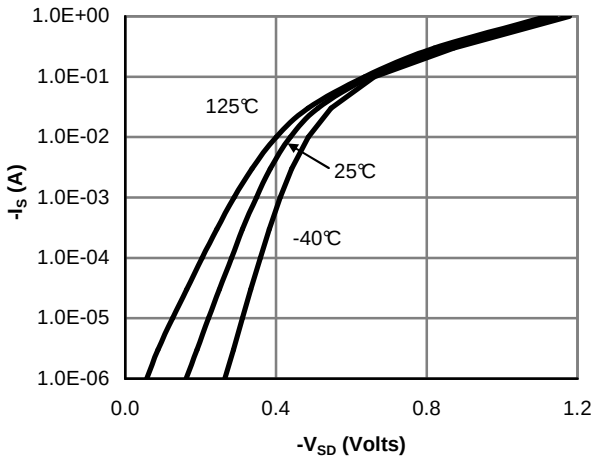


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

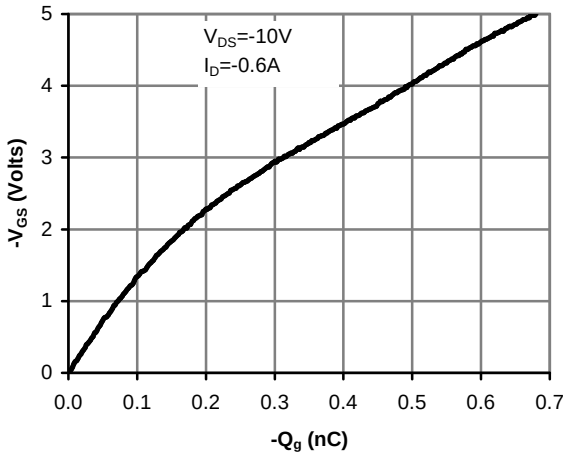


Figure 7: Gate-Charge Characteristics

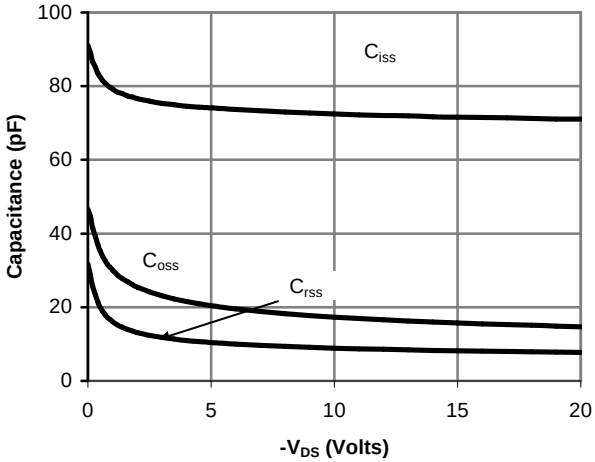


Figure 8: Capacitance Characteristics

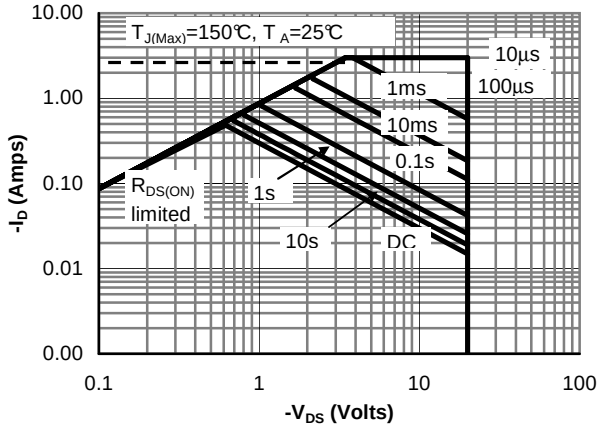


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

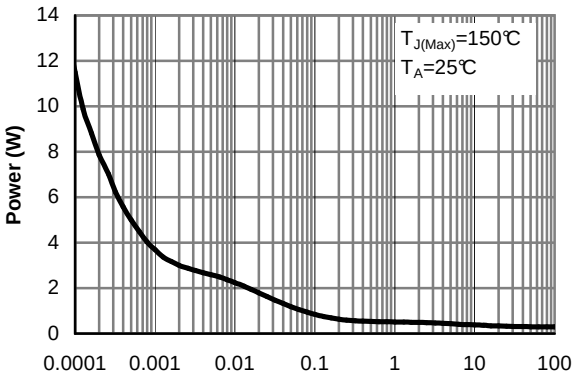


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

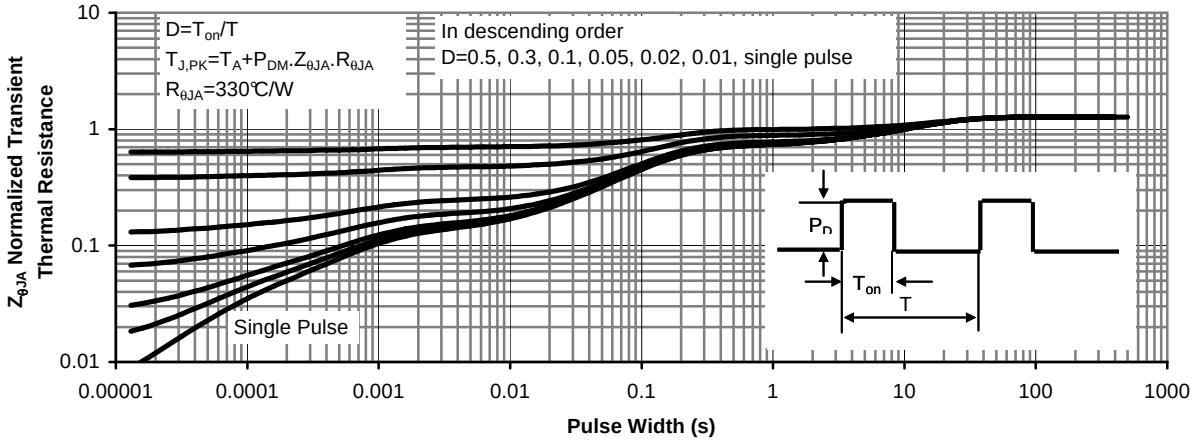
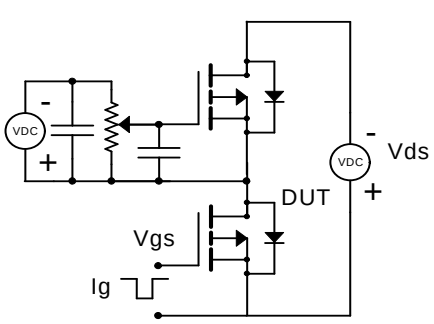
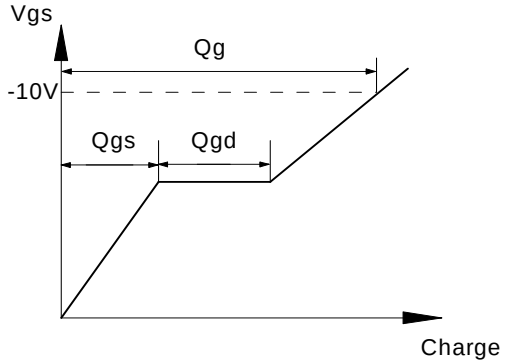


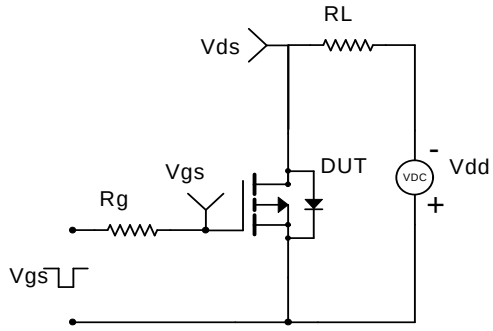
Figure 11: Normalized Maximum Transient Thermal Impedance

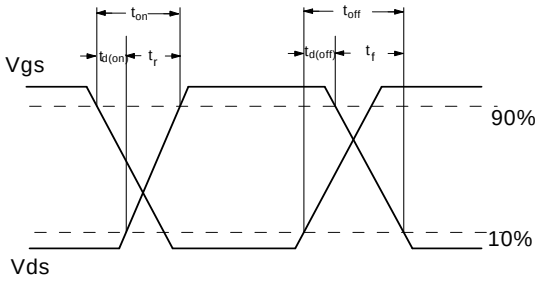
Gate Charge Test Circuit & Waveform





Resistive Switching Test Circuit & Waveforms





Diode Recovery Test Circuit & Waveforms