



AO5800E

Dual N-Channel Enhancement Mode Field Effect Transistor

General Description

The AO5800E uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge, and operation with gate voltages as low as 4.5V, in the small SC89-6L footprint. It can be used for a wide variety of applications, including load switching, low current inverters and low current DC-DC converters. AO5800E and AO5800EL are electrically identical.

- RoHS compliant
- AO5800EL is Halogen Free

Features

- V_{DS} (V) = 60V
- I_D = 0.4A (V_{GS} = 10V)
- $R_{DS(ON)} < 1.6\Omega$ (V_{GS} = 10V)
- $R_{DS(ON)} < 1.9\Omega$ (V_{GS} = 4.5V)

ESD PROTECTED!



Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ^{A, F}	$T_A=25^\circ\text{C}$	0.4	A
	$T_A=70^\circ\text{C}$	0.3	
Pulsed Drain Current ^B	I_{DM}	1.6	
Power Dissipation ^A	$T_A=25^\circ\text{C}$	0.4	W
	$T_A=70^\circ\text{C}$	0.24	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	275	330	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A		Steady-State	360	450
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	300	350	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	60			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=48\text{V}$, $V_{GS}=0\text{V}$			1	μA
		$T_J=55^\circ\text{C}$			5	
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 10\text{V}$			± 1	μA
		$V_{DS}=0\text{V}$, $V_{GS}=\pm 4.5\text{V}$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1	1.6	2.5	V
$I_{D(ON)}$	On state drain current	$V_{GS}=10\text{V}$, $V_{DS}=5\text{V}$	1.6			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$, $I_D=0.4\text{A}$		1.3	1.6	Ω
		$T_J=125^\circ\text{C}$		2.45	3	
		$V_{GS}=4.5\text{V}$, $I_D=0.3\text{A}$		1.5	1.9	Ω
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}$, $I_D=0.4\text{A}$		0.5		S
V_{SD}	Diode Forward Voltage	$I_S=0.1\text{A}$, $V_{GS}=0\text{V}$		0.8	1	V
I_S	Maximum Body-Diode Continuous Current				0.4	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=30\text{V}$, $f=1\text{MHz}$		41	50	pF
C_{oss}	Output Capacitance			9		pF
C_{rss}	Reverse Transfer Capacitance			6		pF
SWITCHING PARAMETERS						
$t_{D(on)}$	Turn-On Delay Time	$V_{GS}=10\text{V}$, $V_{DS}=30\text{V}$, $R_{\theta Jc}=75^\circ\text{C/W}$, $R_{GEN}=3^\circ\text{C/W}$		39.2		ns
t_r	Turn-On Rise Time			35.7		ns
$t_{D(off)}$	Turn-Off Delay Time			261		ns
t_f	Turn-Off Fall Time			79		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=0.4\text{A}$, $di/dt=100\text{A}/\mu\text{s}$, $V_{GS}=-9\text{V}$		11.3	14	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=0.4\text{A}$, $di/dt=100\text{A}/\mu\text{s}$, $V_{GS}=-9\text{V}$		7.5		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. 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 impedance 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 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The SOA curve provides a single pulse rating.

F: The current rating is based on the $t \leq 10\text{s}$ thermal resistance rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

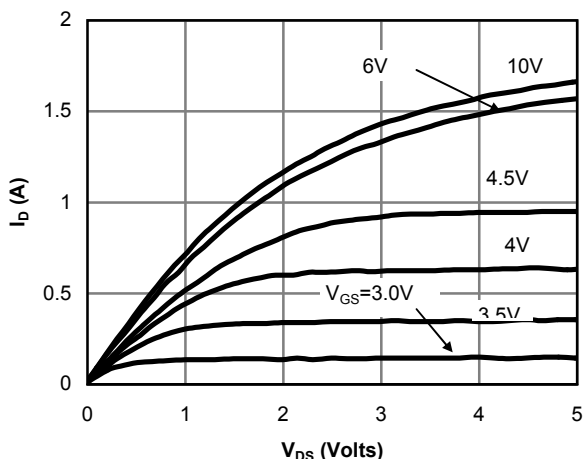


Figure 1: On-Region Characteristics

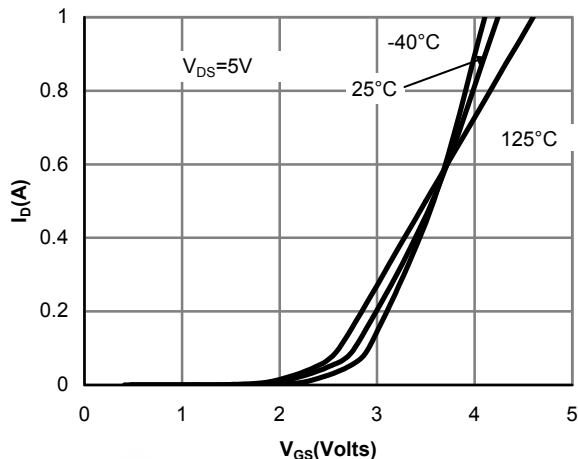


Figure 2: Transfer Characteristics

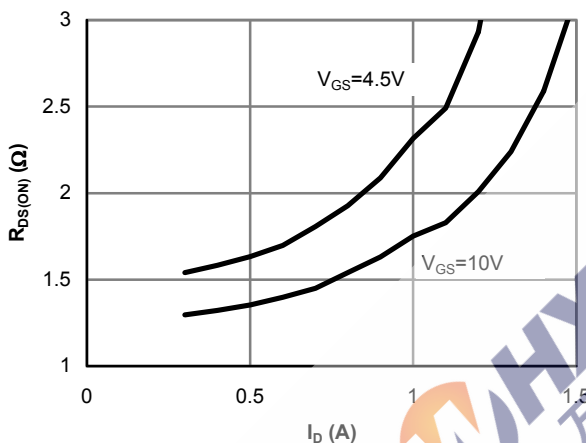


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

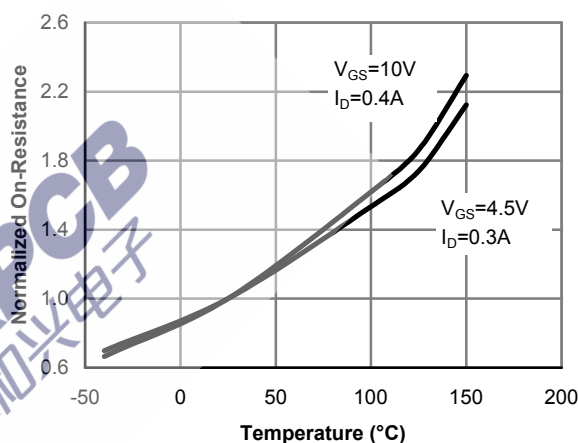


Figure 4: On-Resistance vs. Junction Temperature

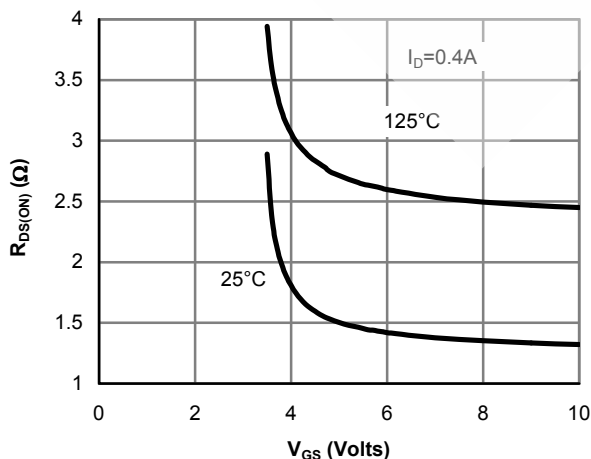


Figure 5: On-Resistance vs. Gate-Source Voltage

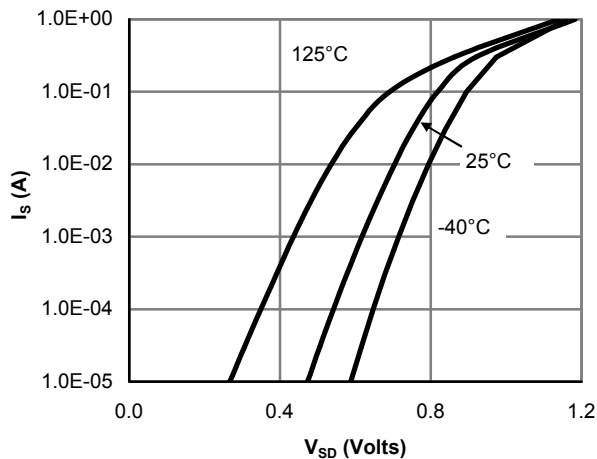


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

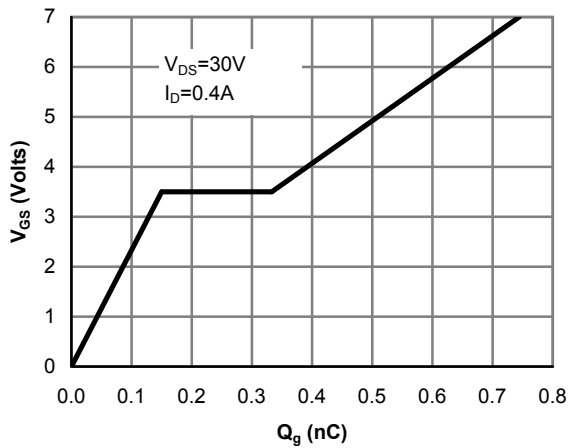


Figure 7: Gate-Charge Characteristics

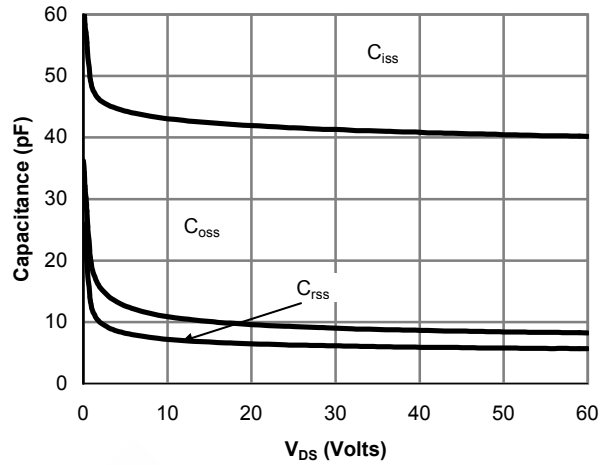


Figure 8: Capacitance Characteristics

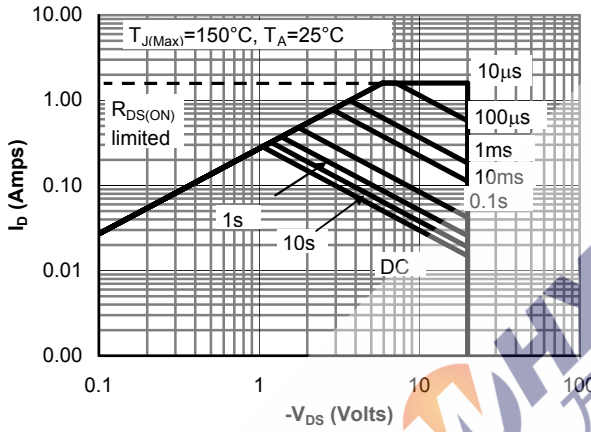


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

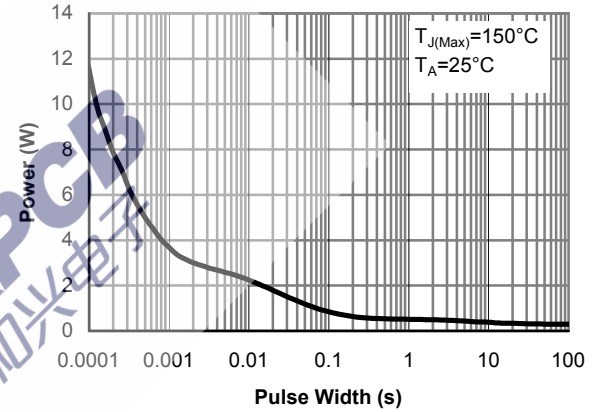


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

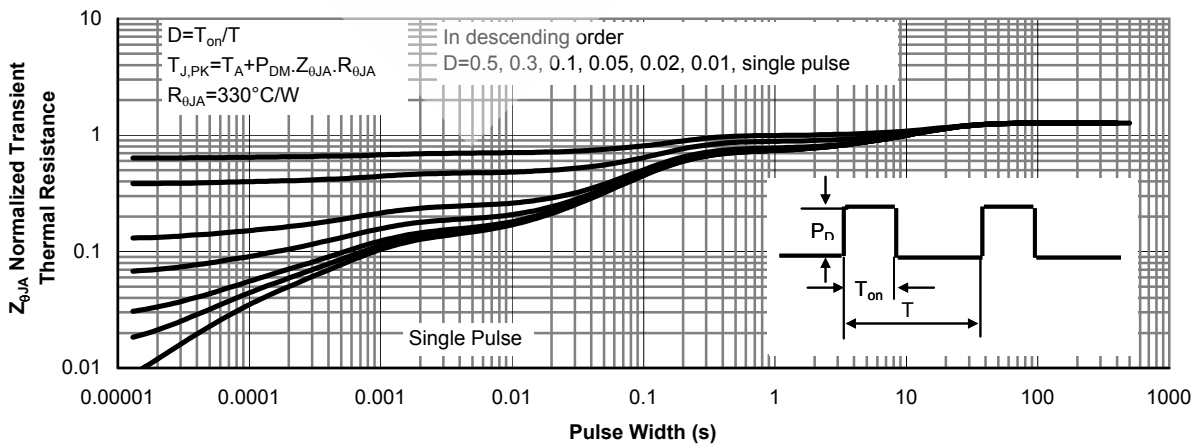
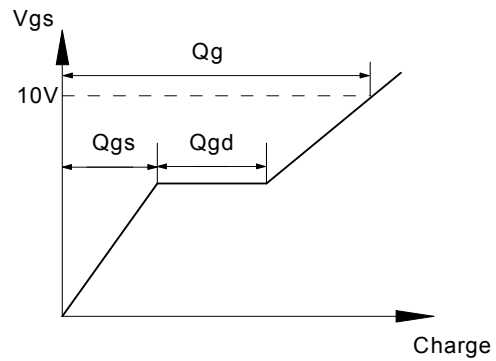
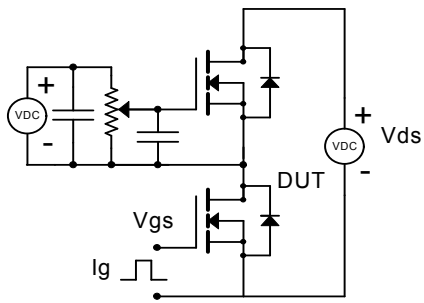
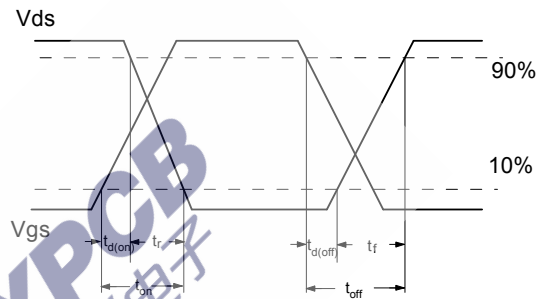
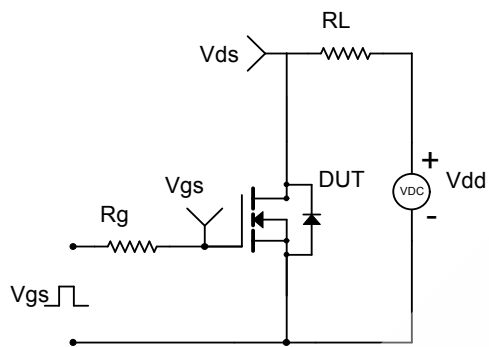


Figure 11: Normalized Maximum Transient Thermal Impedance

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

