



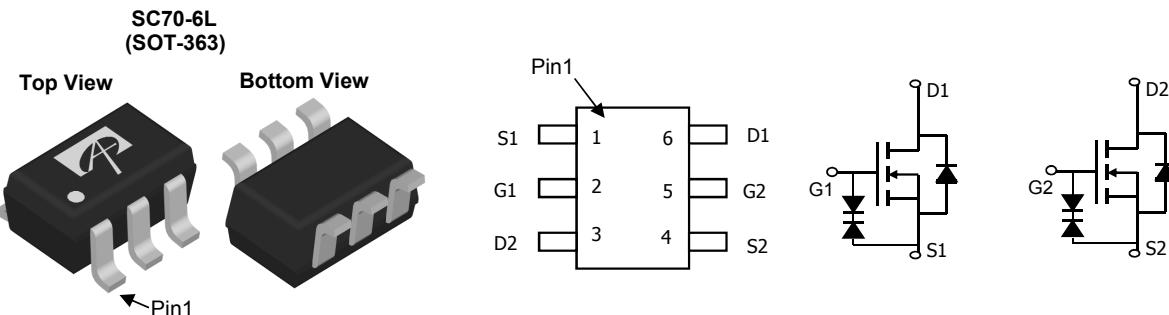
AO7800 Dual N-Channel Enhancement Mode Field Effect Transistor

General Description

The AO7800 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 SOT363 footprint. It can be used for a wide variety of applications, including load switching, low current inverters and low current DC-DC converters. It is ESD protected.

Features

$V_{DS} (V) = 20V$
 $I_D = 0.9 A (V_{GS} = 4.5V)$
 $R_{DS(ON)} < 300m\Omega (V_{GS} = 4.5V)$
 $R_{DS(ON)} < 350m\Omega (V_{GS} = 2.5V)$
 $R_{DS(ON)} < 450m\Omega (V_{GS} = 1.8V)$



Absolute Maximum Ratings $T_A=25^\circ C$ 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	I_D	0.9	A
$T_A=70^\circ C$	I_D	0.7	
Pulsed Drain Current ^B	I_{DM}	5	
Power Dissipation ^A	P_D	0.9	W
$T_A=70^\circ C$	P_D	0.6	
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	$R_{\theta JA}$	120	145	°C/W
Steady-State		156	190	°C/W
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	130	150	°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	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	20			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=16\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$		1	5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm 8\text{V}$		25		μA
$V_{\text{GS(th)}}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	0.5	0.75	0.9	V
$I_{\text{D(ON)}}$	On state drain current	$V_{GS}=4.5\text{V}, V_{DS}=5\text{V}$	5			A
$R_{\text{DS(ON)}}$	Static Drain-Source On-Resistance	$V_{GS}=4.5\text{V}, I_D=0.9\text{A}$ $T_J=125^\circ\text{C}$	181	300		$\text{m}\Omega$
		$V_{GS}=2.5\text{V}, I_D=0.75\text{A}$	253	350		$\text{m}\Omega$
		$V_{GS}=1.8\text{V}, I_D=0.7\text{A}$	237	350		$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}, I_D=0.8\text{A}$		2.6		S
V_{SD}	Diode Forward Voltage	$I_S=0.5\text{A}, V_{GS}=0\text{V}$		0.69	1	V
I_S	Maximum Body-Diode Continuous Current				0.4	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=10\text{V}, f=1\text{MHz}$		101	120	pF
C_{oss}	Output Capacitance			17		pF
C_{rss}	Reverse Transfer Capacitance			14		pF
R_g	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$		3	4	Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	$V_{GS}=4.5\text{V}, V_{DS}=10\text{V}, I_D=0.8\text{A}$		1.57	1.9	nC
Q_{gs}	Gate Source Charge			0.13		nC
Q_{gd}	Gate Drain Charge			0.36		nC
$t_{\text{D(on)}}$	Turn-On Delay Time	$V_{GS}=5\text{V}, V_{DS}=10\text{V}, R_L=12.5\Omega, R_{\text{GEN}}=6\Omega$		3.2		ns
t_r	Turn-On Rise Time			4		ns
$t_{\text{D(off)}}$	Turn-Off Delay Time			15.5		ns
t_f	Turn-Off Fall Time			2.4		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=0.8\text{A}, dI/dt=100\text{A}/\mu\text{s}$		6.7	8.1	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=0.8\text{A}, dI/dt=100\text{A}/\mu\text{s}$		1.6		nC

A: The value of R_{BJA} 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. The current rating is based on the $t \leq 10\text{s}$ thermal resistance rating.

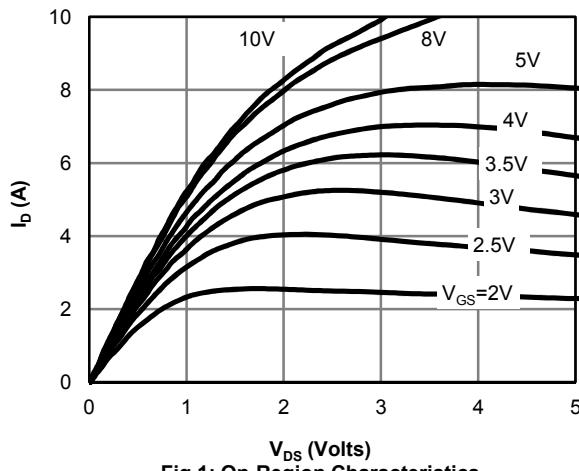
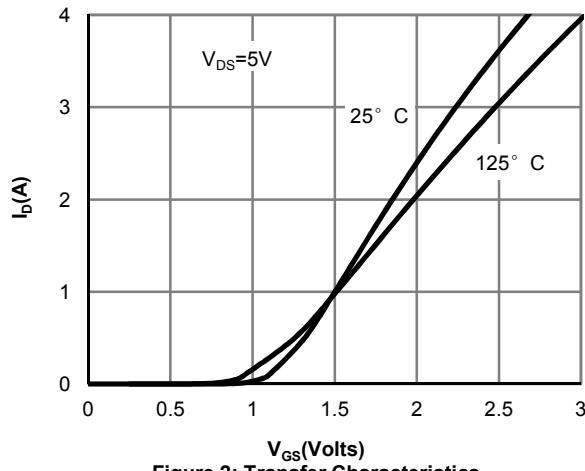
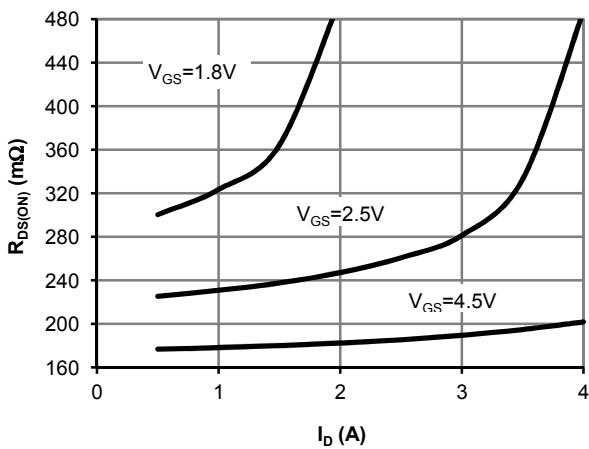
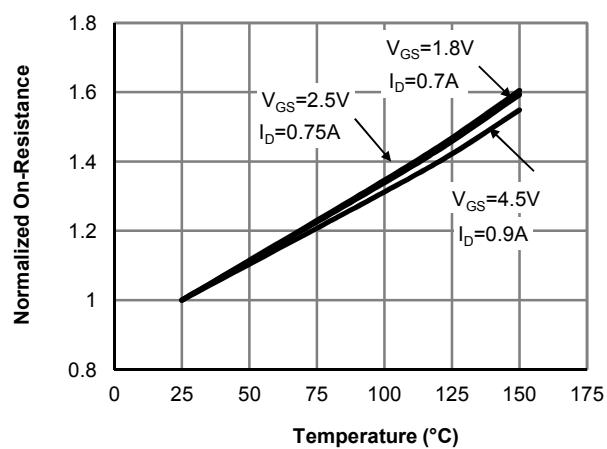
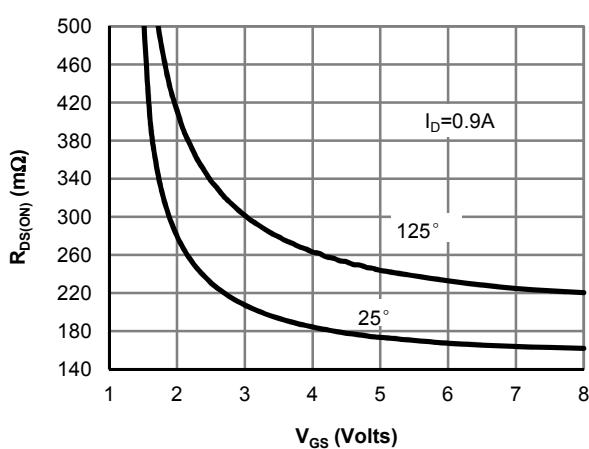
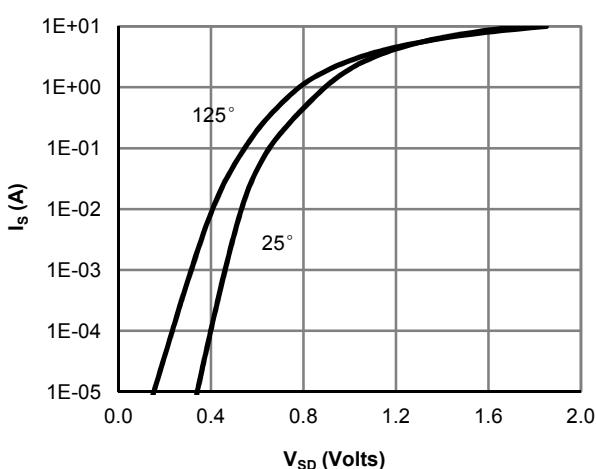
B: Repetitive rating, pulse width limited by junction temperature.

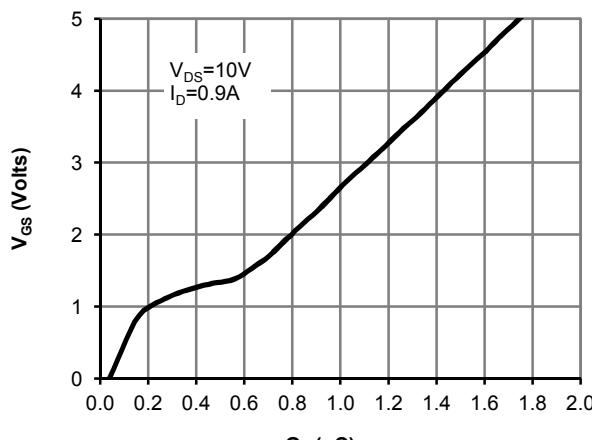
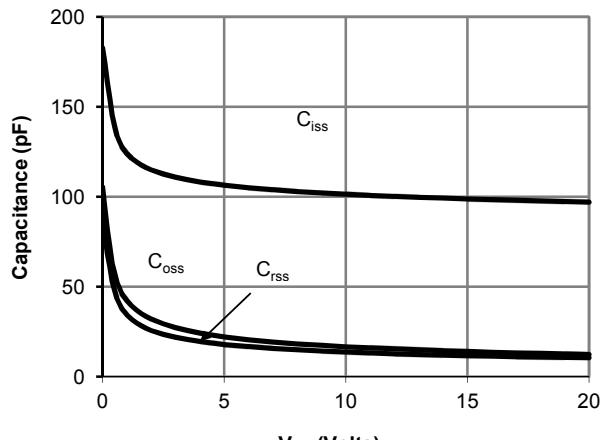
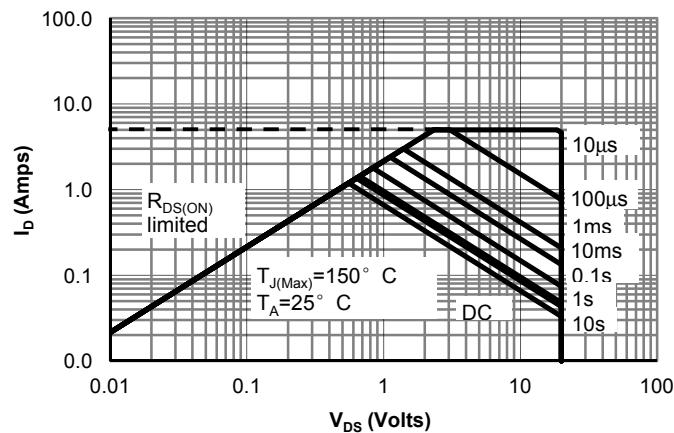
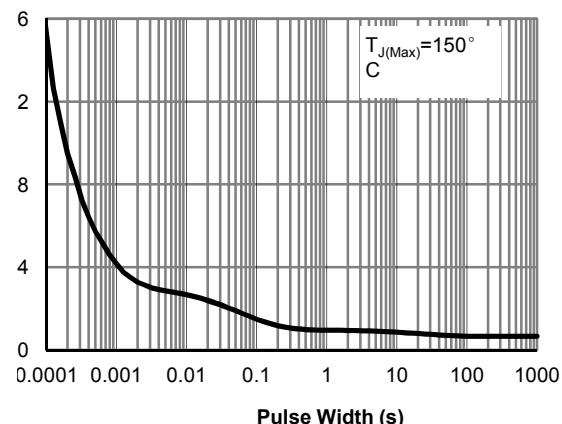
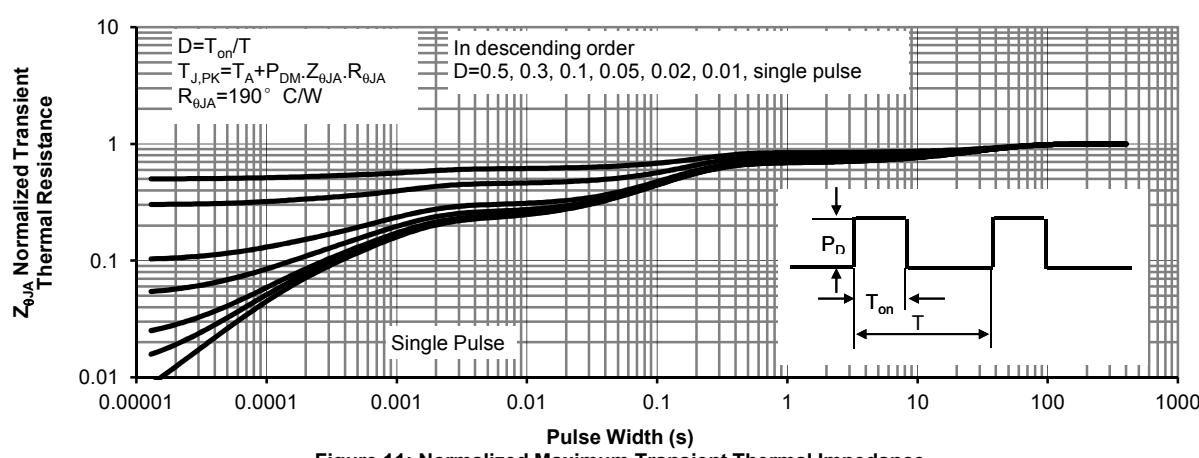
C: The R_{BJA} is the sum of the thermal impedance from junction to lead R_{BJL} and lead to ambient.

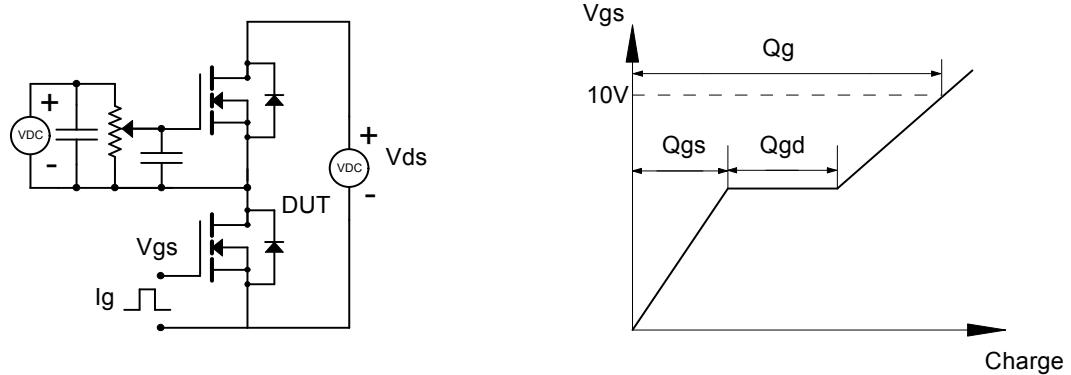
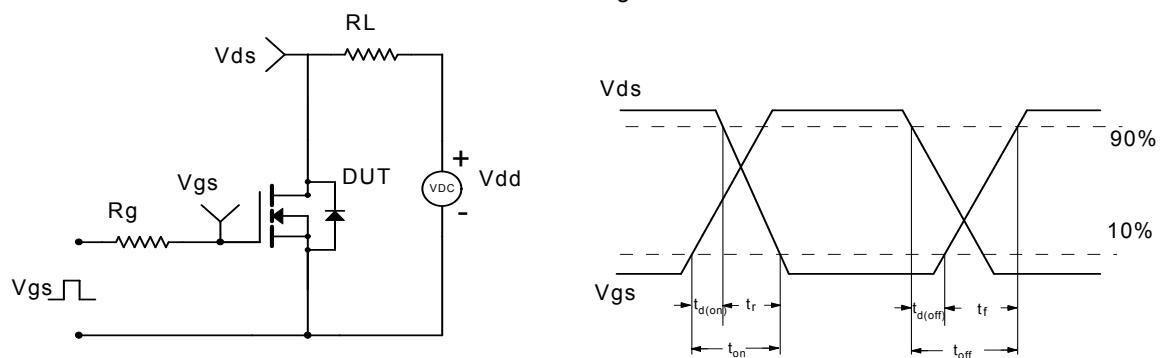
D: The static characteristics in Figures 1 to 6,12,14 are obtained using 80 μs pulses, duty cycle 0.5% max.

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.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Fig 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
