

EVVOSEMI[®]

THINK CHANGE DO



ESD



TVS



MOS



LDO



Diode



Sensor



DC-DC

Product Specification

▶ Domestic	Part Number	AO4616
▶ Overseas	Part Number	AO4616
▶ Equivalent	Part Number	AO4616

EV is the abbreviation of name EVVO

30V P-Channel And N-Channel MOSFET

General Description

The AO4616 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. This complementary N and P channel MOSFET configuration is ideal for low Input Voltage inverter applications.

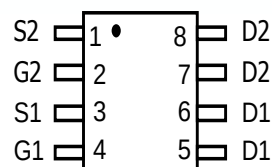
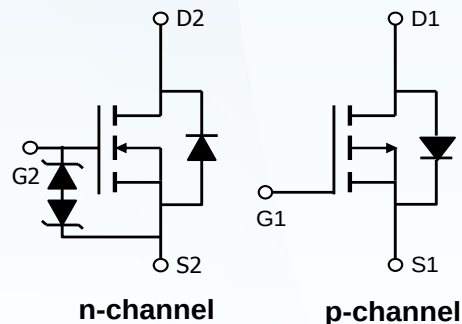
Product Summary

N-Channel

V_{DS}	30V
I_D (at $V_{GS}=-10V$)	8A
$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 20m Ω
$R_{DS(ON)}$ (at $V_{GS}= 4.5V$)	< 28m Ω

P-Channel

V_{DS}	-30V
I_D (at $V_{GS}=-10V$)	-7A
$R_{DS(ON)}$ (at $V_{GS}=-10V$)	< 22m Ω
$R_{DS(ON)}$ (at $V_{GS}= -4.5V$)	< 40m Ω



SOP-8

Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted					
Parameter	Symbol	Max n-channel	Max p-channel	Units	
Drain-Source Voltage	V_{DS}	30	-30	V	
Gate-Source Voltage	V_{GS}	± 20	± 20	V	
Continuous Drain Current	I_D	8	-7	A	
		6.5	-6		
Pulsed Drain Current ^C	I_{DM}	40	-40		
Avalanche Current ^C	I_{AS}, I_{AR}	19	27	A	
Avalanche energy $L=0.1\text{mH}$ ^C	E_{AS}, E_{AR}	18	36	mJ	
Power Dissipation ^B	P_D	2	2	W	
		1.3	1.3		
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	$R_{\theta JA}$	48	62.5	$^\circ\text{C/W}$	
Maximum Junction-to-Ambient ^{A, D}		74	90	$^\circ\text{C/W}$	
Maximum Junction-to-Lead	$R_{\theta JL}$	32	40	$^\circ\text{C/W}$	

30V P-Channel And N-Channel MOSFET

N-Channel 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	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	30			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=30\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1 5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 16\text{V}$			10	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1.2	1.8	2.4	V
$I_{D(ON)}$	On state drain current	$V_{GS}=10\text{V}$, $V_{DS}=5\text{V}$	40			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$, $I_D=8\text{A}$		14.5	20	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}$, $I_D=6\text{A}$		19.5	28	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}$, $I_D=8\text{A}$		30		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}$, $V_{GS}=0\text{V}$		0.75	1	V
I_S	Maximum Body-Diode Continuous Current				2.5	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=15\text{V}$, $f=1\text{MHz}$	600	740	888	pF
C_{oss}	Output Capacitance		77	110	145	pF
C_{rss}	Reverse Transfer Capacitance		50	82	115	pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$	0.5	1.1	1.7	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $I_D=8\text{A}$	12	15	18	nC
$Q_g(4.5\text{V})$	Total Gate Charge		6	7.5	9	nC
Q_{gs}	Gate Source Charge			2.5		nC
Q_{gd}	Gate Drain Charge			3		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $R_L=1.8\Omega$, $R_{GEN}=3\Omega$		5		ns
t_r	Turn-On Rise Time			3.5		ns
$t_{D(off)}$	Turn-Off DelayTime			19		ns
t_f	Turn-Off Fall Time			3.5		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=8\text{A}$, $dI/dt=500\text{A}/\mu\text{s}$	6	8	10	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=8\text{A}$, $dI/dt=500\text{A}/\mu\text{s}$	14	18	22	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 $T_A=25^\circ\text{C}$. The value in any given application depends on the user's specific board design.

B. The power dissipation P_D is based on $T_{J(MAX)}=150^\circ\text{C}$, using $\leq 10\text{s}$ junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=150^\circ\text{C}$. Ratings are based on low frequency and duty cycles to keep initial $T_J=25^\circ\text{C}$.

D. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using $<300\mu\text{s}$ pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, assuming a maximum junction temperature of $T_{J(MAX)}=150^\circ\text{C}$. The SOA curve provides a single pulse rating.

30V P-Channel And N-Channel MOSFET

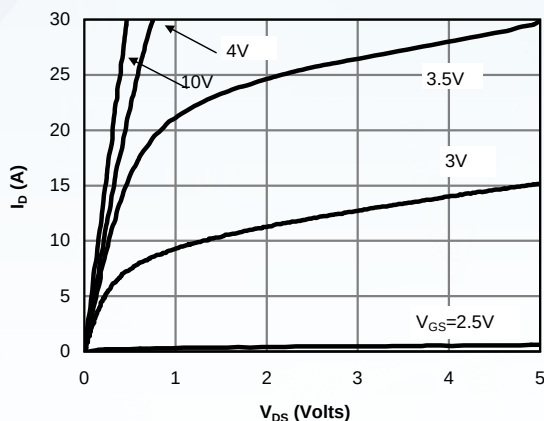


Fig 1: On-Region Characteristics (Note E)

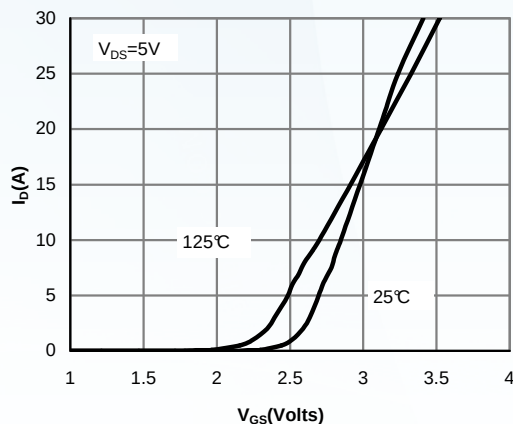


Figure 2: Transfer Characteristics (Note E)

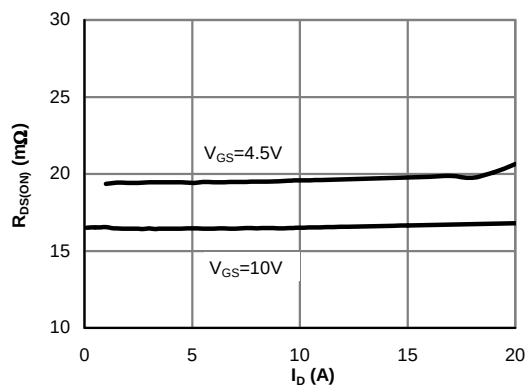


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

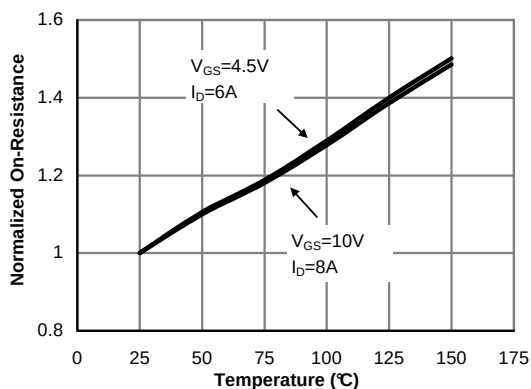


Figure 4: On-Resistance vs. Junction Temperature (Note E)

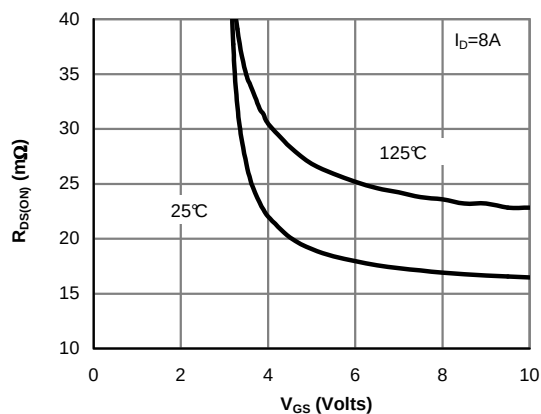


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

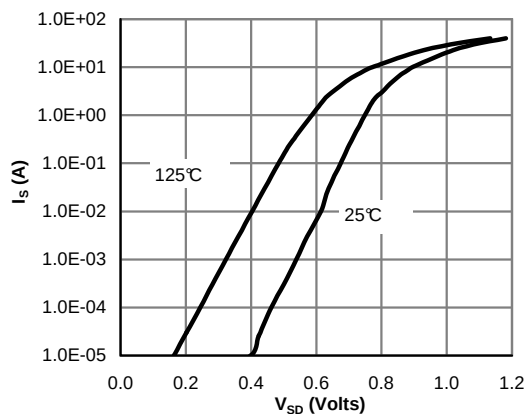


Figure 6: Body-Diode Characteristics (Note E)

30V P-Channel And N-Channel MOSFET

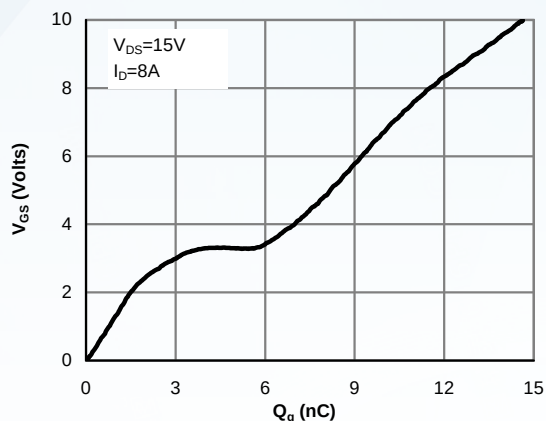


Figure 7: Gate-Charge Characteristics

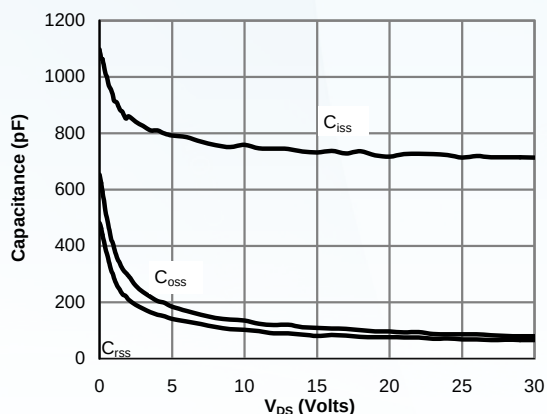


Figure 8: Capacitance Characteristics

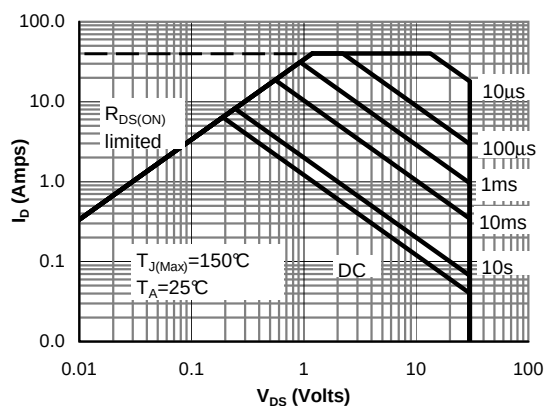


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

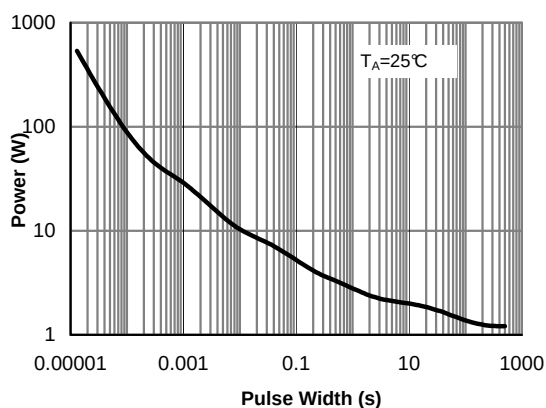


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

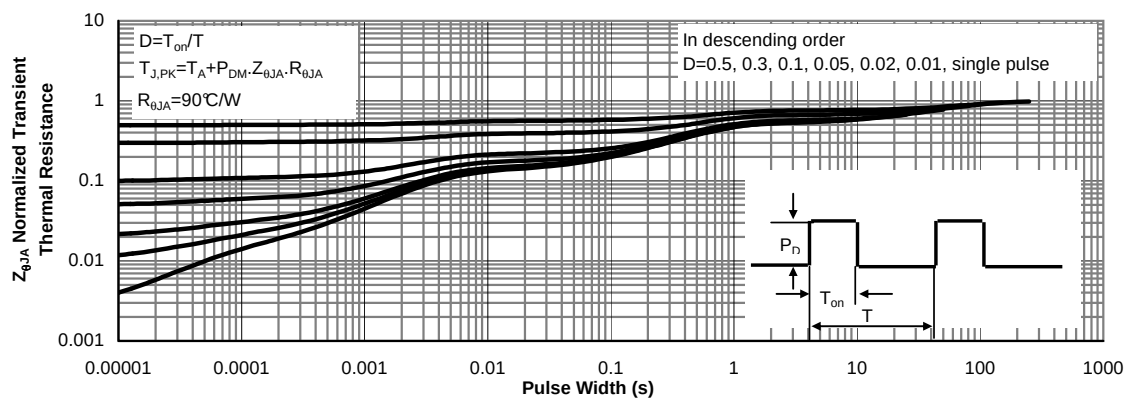
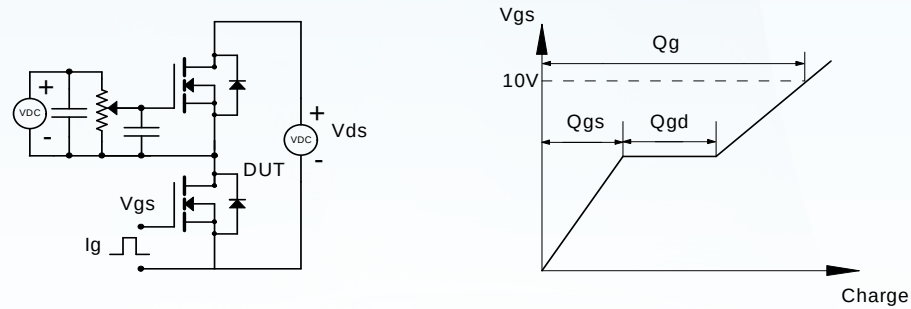


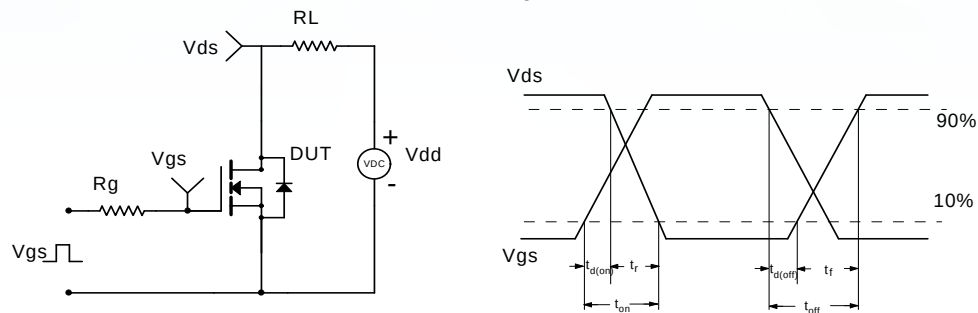
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

30V P-Channel And N-Channel MOSFET

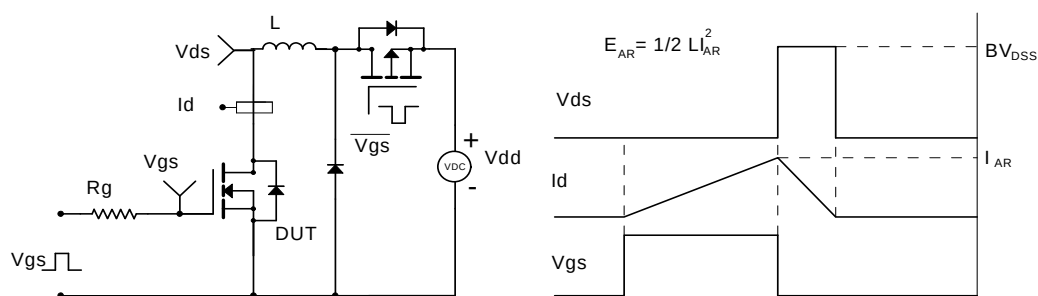
Gate Charge Test Circuit & Waveform



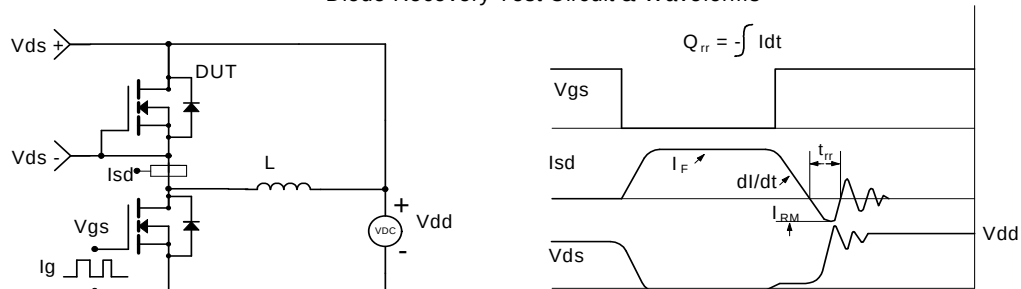
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



30V P-Channel And N-Channel MOSFET

P-Channel 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	-30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-30V, V _{GS} =0V T _J =55°C			-1 -5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±20V			100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} I _D =-250μA	-1.4	-2.0	-2.5	V
I _{D(ON)}	On state drain current	V _{GS} =-10V, V _{DS} =-5V	-40			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-10V, I _D =-7A		17.5	22	mΩ
		V _{GS} =-4.5V, I _D =-3.5A		27.5	40	mΩ
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-7A		24		S
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V		-0.75	-1	V
I _S	Maximum Body-Diode Continuous Current				-2.5	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-15V, f=1MHz	830	1040	1250	pF
C _{oss}	Output Capacitance		125	180	235	pF
C _{rss}	Reverse Transfer Capacitance		75	125	175	pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	2	4	6	Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge	V _{GS} =10V, V _{DS} =-15V, I _D =-7A	15	19	23	nC
Q _g (4.5V)	Total Gate Charge		7.5	9.6	12	nC
Q _{gs}	Gate Source Charge			3.6		nC
Q _{gd}	Gate Drain Charge			4.6		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =-15V, R _L =2.2Ω, R _{GEN} =3Ω		10		ns
t _r	Turn-On Rise Time			5.5		ns
t _{D(off)}	Turn-Off DelayTime			26		ns
t _f	Turn-Off Fall Time			9		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =-7A, dI/dt=500A/μs		11.5	15	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-7A, dI/dt=500A/μs		25	32.5	nC

A. The value of R_{θJA} is measured with the device mounted on 1in² 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. The power dissipation P_D is based on T_{J(MAX)}=150°C, using ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150°C. Ratings are based on low frequency and duty cycles to keep initial T_J=25°C.

D. The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} and lead to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T_{J(MAX)}=150°C. The SOA curve provides a single pulse rating.

30V P-Channel And N-Channel MOSFET

P-Channel: TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

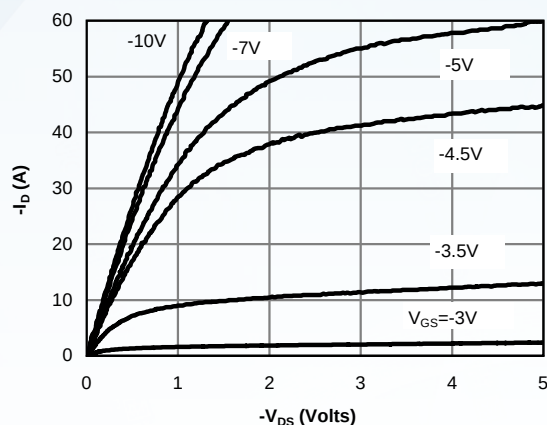


Fig 1: On-Region Characteristics (Note E)

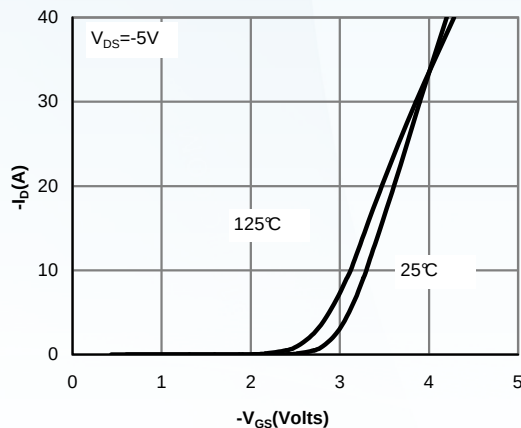


Figure 2: Transfer Characteristics (Note E)

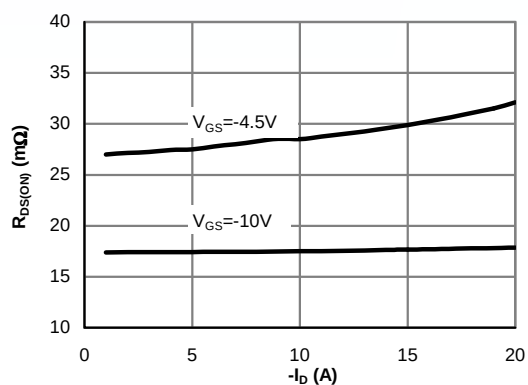


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

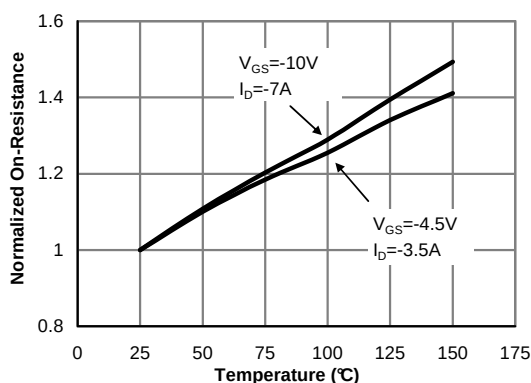


Figure 4: On-Resistance vs. Junction Temperature (Note E)

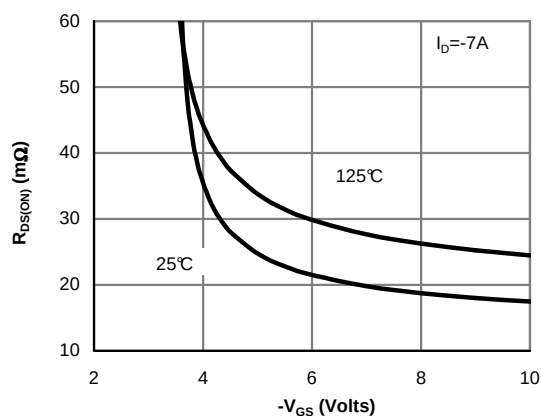


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

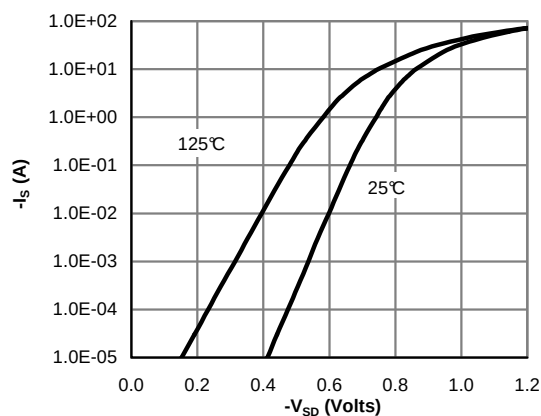


Figure 6: Body-Diode Characteristics (Note E)

30V P-Channel And N-Channel MOSFET

P-Channel: TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

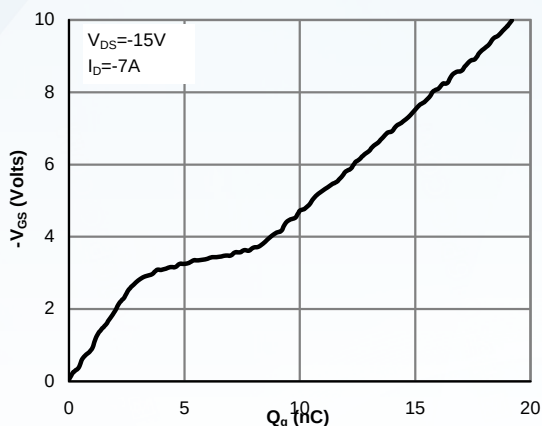


Figure 7: Gate-Charge Characteristics

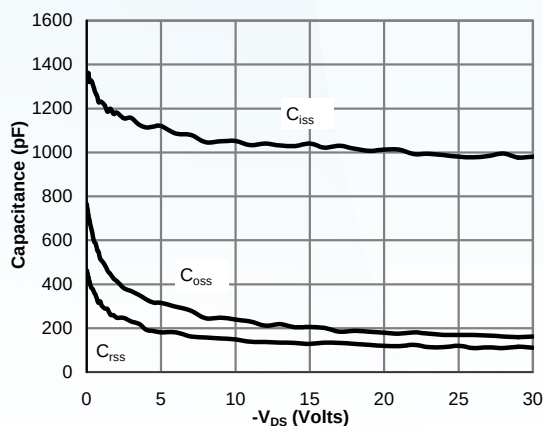


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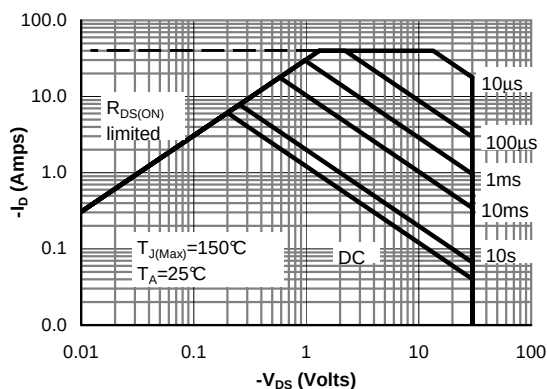


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

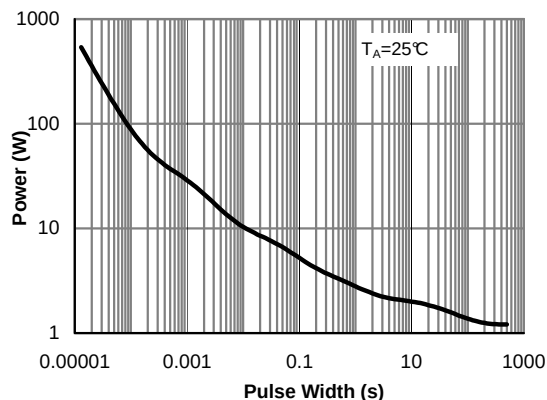


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

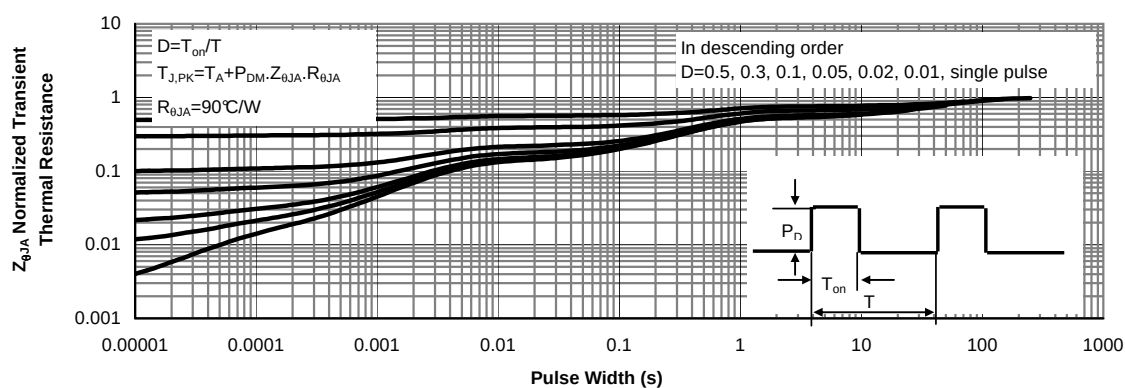
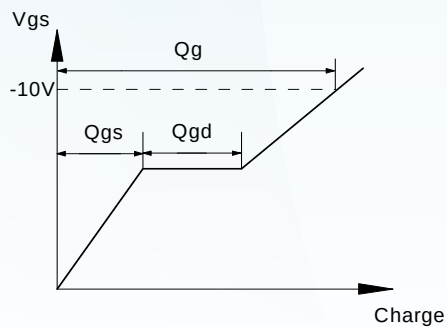
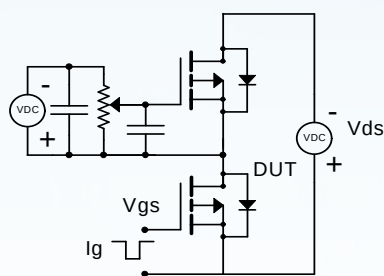


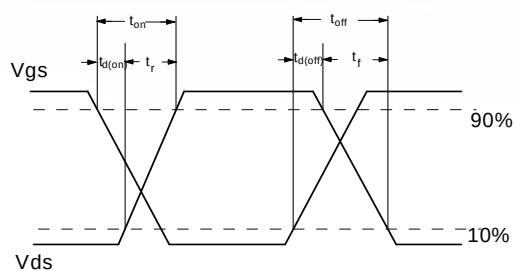
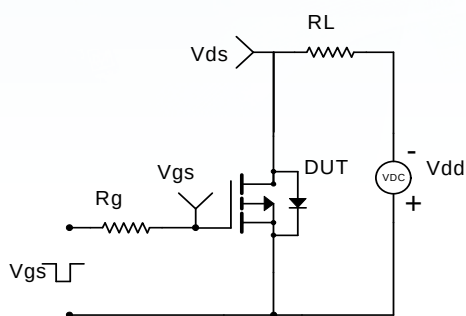
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

30V P-Channel And N-Channel MOSFET

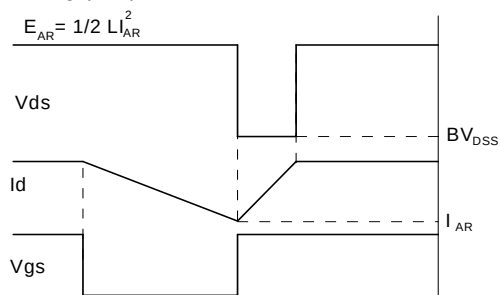
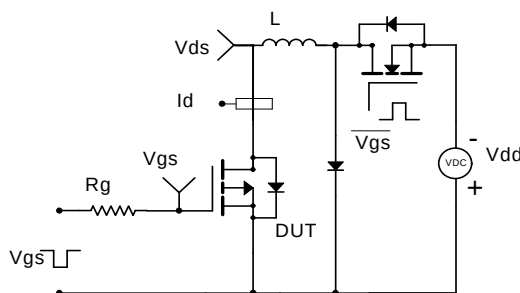
Gate Charge Test Circuit & Waveform



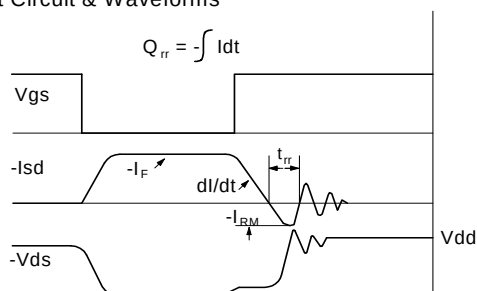
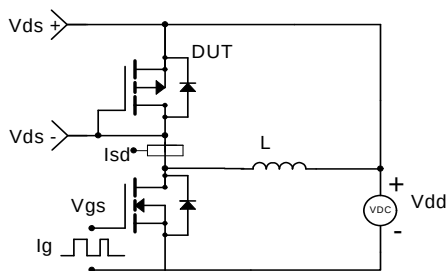
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



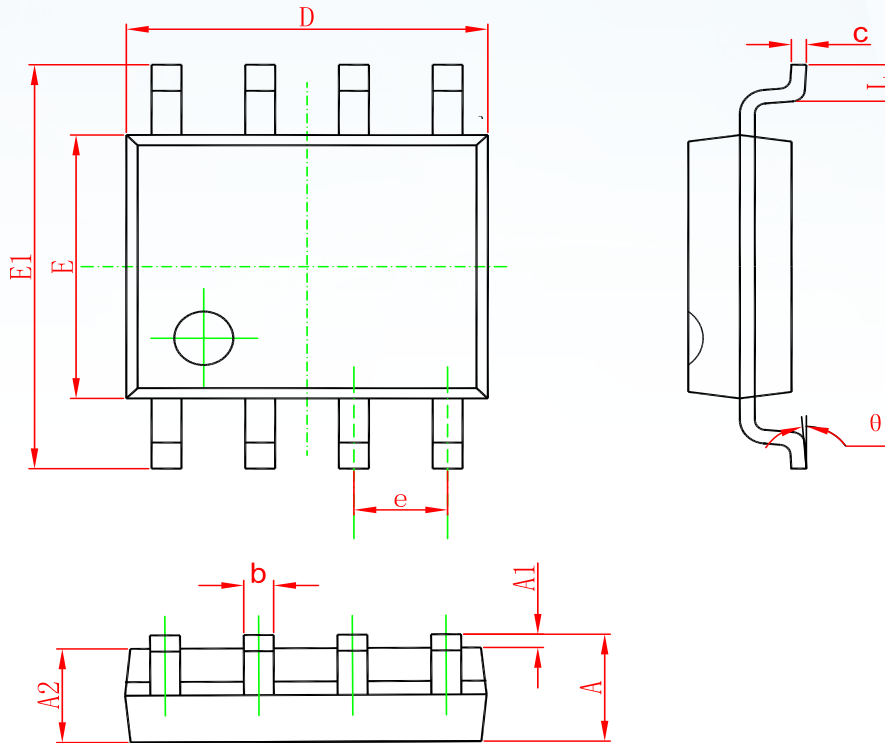
Diode Recovery Test Circuit & Waveforms



30V P-Channel And N-Channel MOSFET

PACKAGE OUTLINE DIMENSIONS

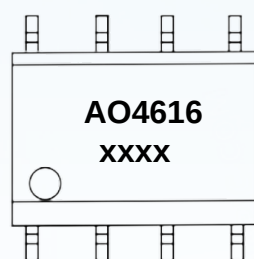
SOP-8



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°

30V P-Channel And N-Channel MOSFET

Marking



("xxxx"代表年份周期)

Ordering information

Order code	Package	Baseqty	Deliverymode
AO4616	SOP-8	3000	Tape and reel

Disclaimer

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