

General Description

- Latest Trench Power AlphaMOS (α MOS LV) technology
- Very Low $R_{DS(ON)}$ at 2.5V V_{GS}
- Low Gate Charge
- ESD protection
- RoHS and Halogen-Free Compliant

Application

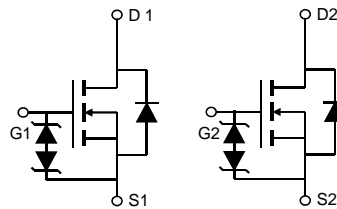
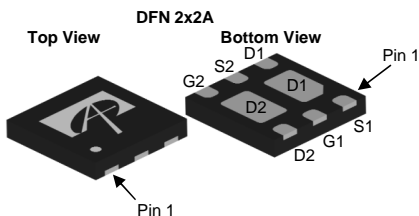
- DC/DC Converters

Product Summary

V_{DS}	30V
I_D (at $V_{GS}=10V$)	2A
$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 44 m Ω
$R_{DS(ON)}$ (at $V_{GS}=4.5V$)	< 52 m Ω
$R_{DS(ON)}$ (at $V_{GS}=2.5V$)	< 74 m Ω

Typical ESD protection

HBM Class 3A



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current ^G	I_D	2	A
$T_A=25^\circ\text{C}$		1.6	
Pulsed Drain Current ^C	I_{DM}	8	
V_{DS} Spike	V_{SPIKE}	36	V
Power Dissipation ^B	P_D	2.5	W
		$T_A=25^\circ\text{C}$	
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	$R_{\theta JA}$	40	50	$^\circ\text{C}/\text{W}$
$t \leq 10\text{s}$		65	80	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Ambient ^{A,D}				
Steady-State				

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} =±10V			±10	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.6	1	1.4	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =2A T _J =125°C		36 50	44 61	mΩ
		V _{GS} =4.5V, I _D =1A		41	52	
		V _{GS} =2.5V, I _D =1A		56	74	
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =2A		9.5		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.75	1	V
I _S	Maximum Body-Diode Continuous Current ⁶				2	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz		235		pF
C _{oss}	Output Capacitance			75		pF
C _{riss}	Reverse Transfer Capacitance			15		pF
R _g	Gate resistance	f=1MHz	4	8	12	Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =2A		4.5	10	nC
Q _g (4.5V)	Total Gate Charge			2.2	6	nC
Q _{gs}	Gate Source Charge			0.3		nC
Q _{gd}	Gate Drain Charge			0.7		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =15V, R _L =7.5Ω, R _{GEN} =3Ω		3		ns
t _r	Turn-On Rise Time			3		ns
t _{D(off)}	Turn-Off DelayTime			24		ns
t _f	Turn-Off Fall Time			6		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =2A, di/dt=100A/μs		7.2		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =2A, di/dt=100A/μs		1.3		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.

B. The Power dissipation P_D is based on R_{θJA} t ≤ 10s value and the maximum allowed junction temperature of 150° C. The value in any given application depends on the user's specific board design.

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 case R_{θJC} and case 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-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_{J(MAX)}=150° C. The SOA curve provides a single pulse rating.

G. The maximum current rating is package limited.

H. 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° C.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

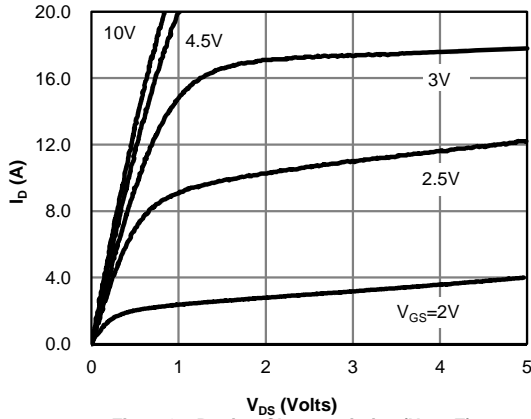


Fig 1: On-Region Characteristics (Note E)

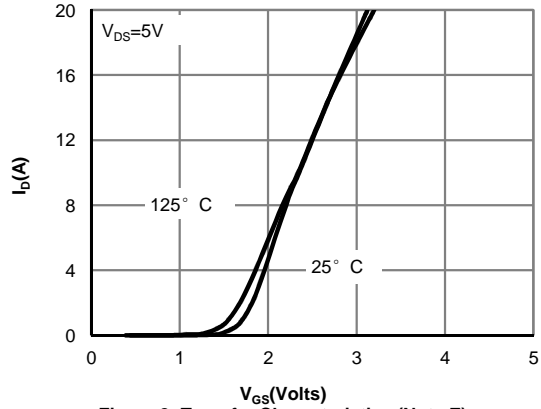


Figure 2: Transfer Characteristics (Note E)

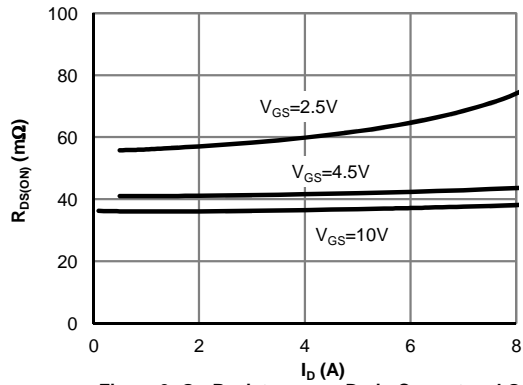


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

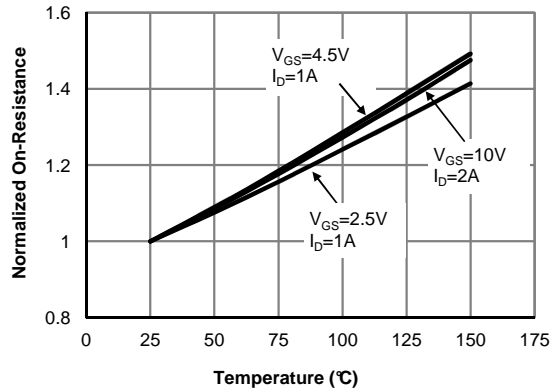


Figure 4: On-Resistance vs. Junction Temperature (Note E)

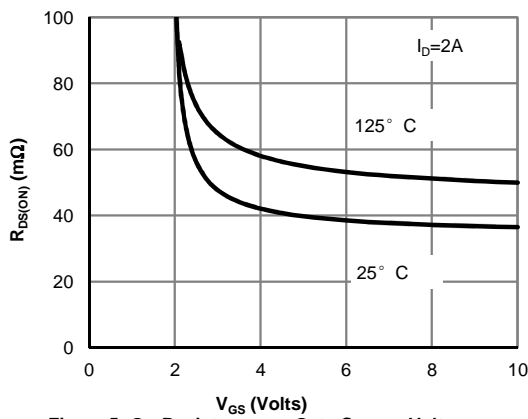


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

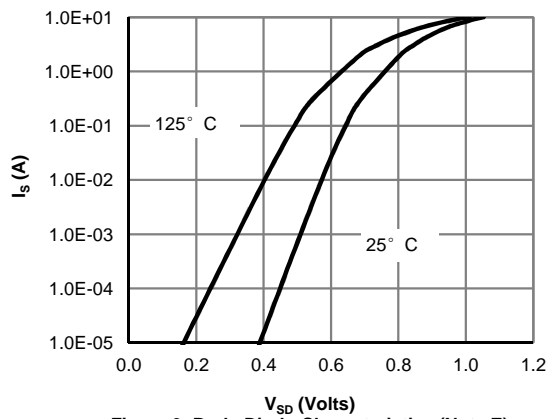


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

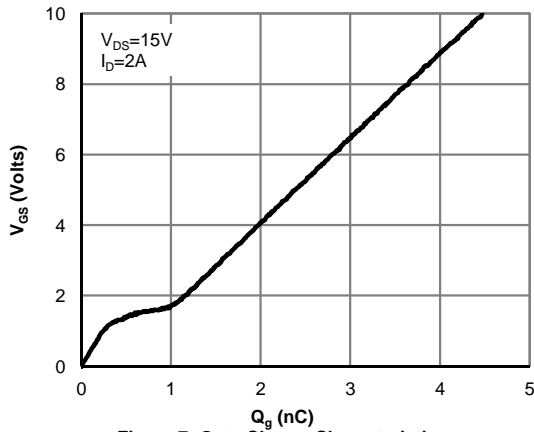


Figure 7: Gate-Charge Characteristics

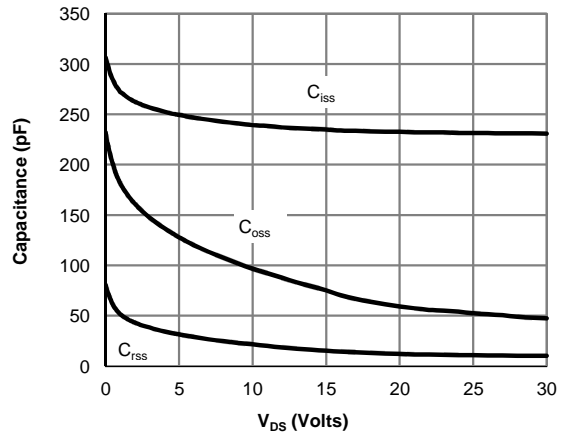


Figure 8: Capacitance Characteristics

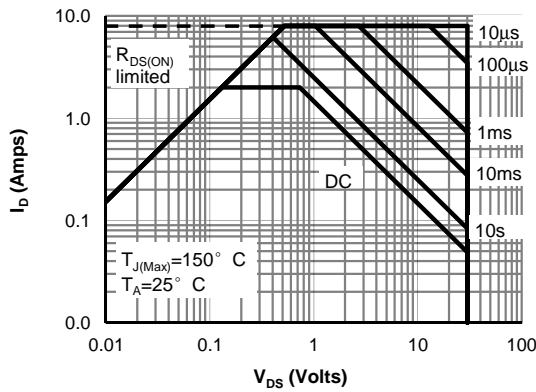


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

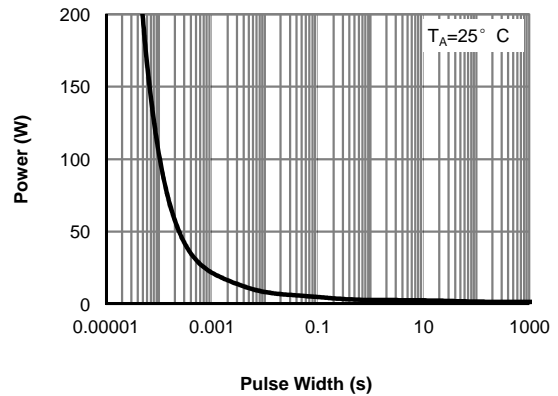


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

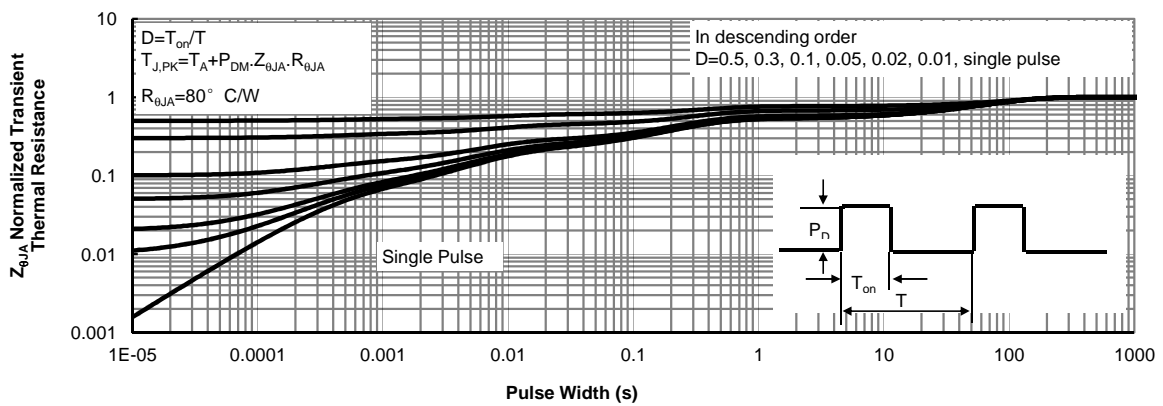
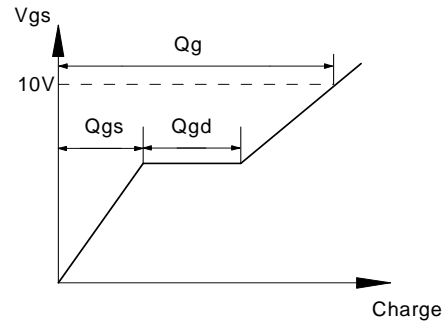
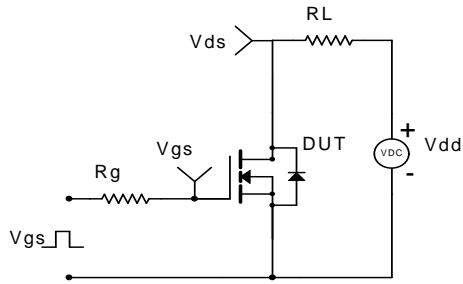


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

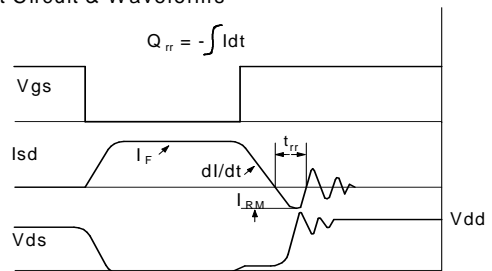
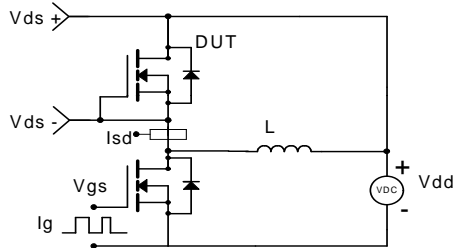
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



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