

General Description

- Trench Power MOSFET technology
- Low $R_{SS(ON)}$
- With ESD protection to improve battery performance and safety
- Common drain configuration for design simplicity
- RoHS and Halogen-Free Compliant

Applications

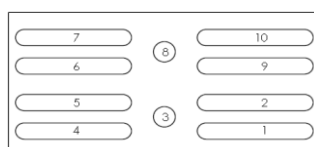
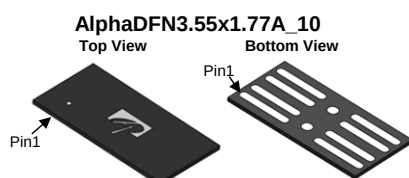
- Battery protection switch
- Mobile device battery charging and discharging

Product Summary

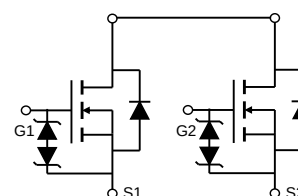
V_{SS}	12V
$R_{SS(ON)}$ (at $V_{GS}=4.5V$)	< 2m Ω
$R_{SS(ON)}$ (at $V_{GS}=4.0V$)	< 2.1m Ω
$R_{SS(ON)}$ (at $V_{GS}=3.8V$)	< 2.2m Ω
$R_{SS(ON)}$ (at $V_{GS}=3.1V$)	< 2.7m Ω
$R_{SS(ON)}$ (at $V_{GS}=2.5V$)	< 3.3m Ω

Typical ESD protection

HBM Class 2



1,2,4,5. Source1(FET1) 3. Gate1 (FET1)
6,7,9,10. Source2(FET2) 8. Gate2 (FET2)



Orderable Part Number	Package Type	Form	Minimum Order Quantity
AOC3878	AlphaDFN3.55x1.77A_10	Tape & Reel	5000

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

Parameter	Symbol	Rating	Units
Source-Source Voltage	V_{SS}	12	V
Gate-Source Voltage	V_{GS}	± 8	V
Source Current(DC) ^{Note1}	I_S	35	A
Source Current(Pulse) ^{Note2}	I_{SM}	130	A
Power Dissipation ^{Note1}	P_D	3.1	W
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ C$

Thermal Characteristics

Parameter	Symbol	Typical	Units
Maximum Junction-to-Ambient $t \leq 10s$	$R_{\theta JA}$	30	$^\circ C/W$
Maximum Junction-to-Ambient Steady-State		40	$^\circ C/W$

Note 1. I_S rated value is based on bare silicon.Mounted on 70mmx70mm FR-4 board.

Note 2. PW <10 μs pulses, duty cycle 1% max.

Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV _{SSS}	Source-Source Breakdown Voltage	I _S =250μA, V _{GS} =0V Test Circuit 6	12			V
I _{SSS}	Zero Gate Voltage Source Current	V _{SS} =12V, V _{GS} =0V Test Circuit 1 T _J =55°C			1 5	μA
I _{GSS}	Gate leakage current	V _{SS} =0V, V _{GS} =±8V Test Circuit 2			±10	μA
V _{GS(th)}	Gate Threshold Voltage	V _{SS} =V _{GS} , I _S =250μA Test Circuit 3	0.4	0.7	1.1	V
R _{SS(ON)}	Static Source to Source On-Resistance	V _{GS} =4.5V, I _S =5A Test Circuit 4 T _J =125°C	1.1 1.5	1.65 2.25	2.0 2.7	mΩ
		V _{GS} =4.0V, I _S =5A Test Circuit 4	1.2	1.7	2.1	mΩ
		V _{GS} =3.8V, I _S =5A Test Circuit 4	1.25	1.75	2.2	mΩ
		V _{GS} =3.1V, I _S =5A Test Circuit 4	1.35	1.95	2.7	mΩ
		V _{GS} =2.5V, I _S =5A Test Circuit 4	1.6	2.3	3.3	mΩ
g _{FS}	Forward Transconductance	V _{SS} =5V, I _S =5A Test Circuit 3		55		S
V _{FSS}	Forward Source to Source Voltage	I _S =1A, V _{GS} =0V Test Circuit 5		0.52	1	V
DYNAMIC PARAMETERS						
R _g	Gate resistance	f=1MHz		1.0		KΩ
SWITCHING PARAMETERS						
Q _g	Total Gate Charge	V _{G1S1} =4.5V, V _{SS} =6V, I _S =5A		60		nC
t _{D(on)}	Turn-On DelayTime	V _{G1S1} =4.5V, V _{SS} =6V, R _L =1.2Ω, R _{GEN} =3Ω Test Circuit8		2.1		μs
t _r	Turn-On Rise Time			4.3		μs
t _{D(off)}	Turn-Off DelayTime			3.1		μs
t _f	Turn-Off Fall Time			14		μs

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

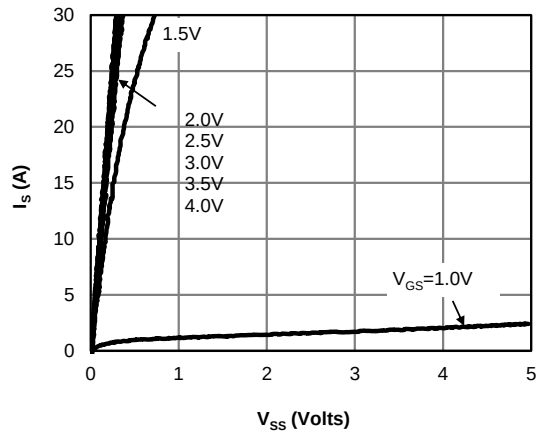


Figure 1: On-Region Characteristics

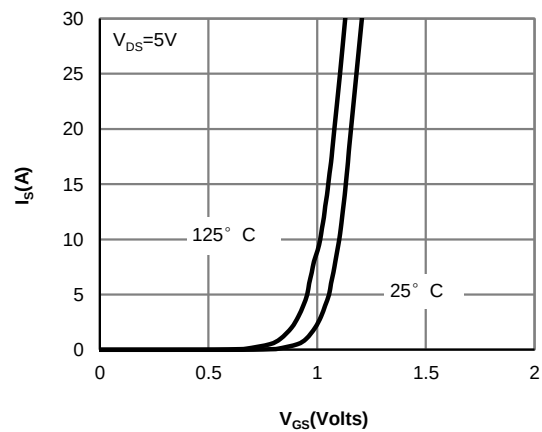


Figure 2: Transfer Characteristics

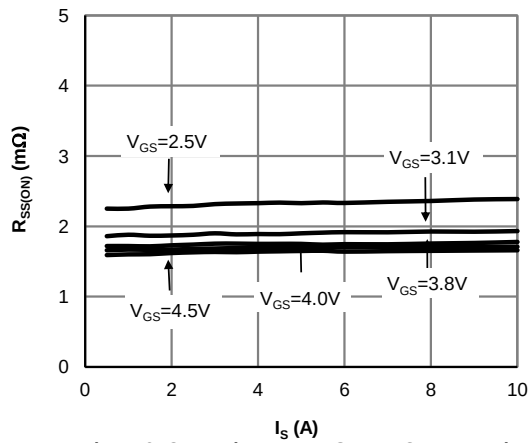


Figure 3: On-Resistance vs. Source Current and Gate Voltage

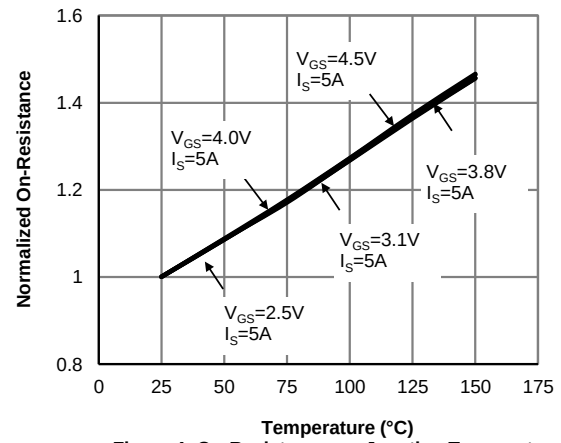


Figure 4: On-Resistance vs. Junction Temperature

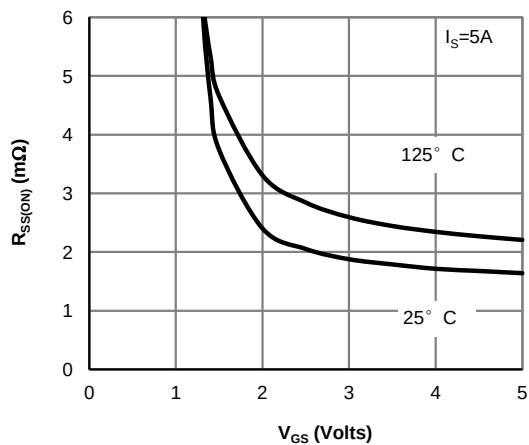


Figure 5: On-Resistance vs. Gate-Source Voltage

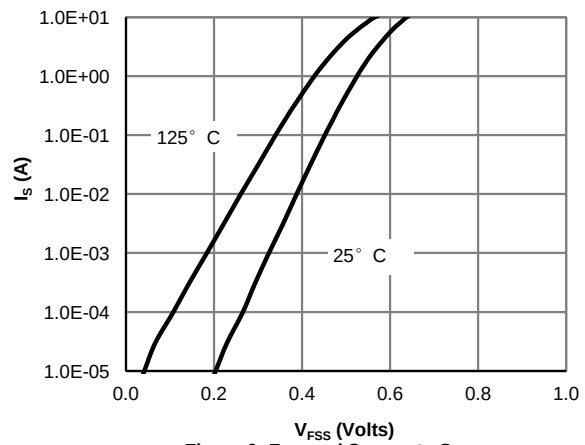


Figure 6: Forward Source to Source Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

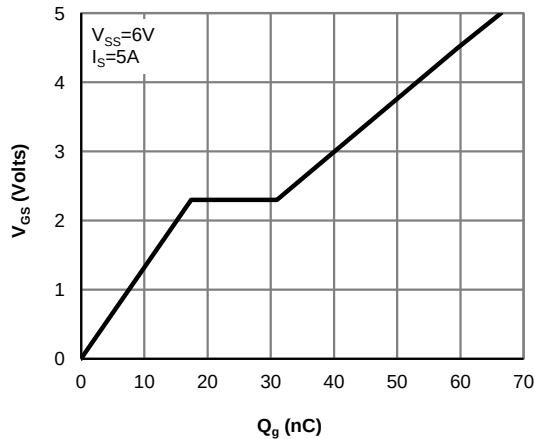


Figure 7: Gate-Charge Characteristics

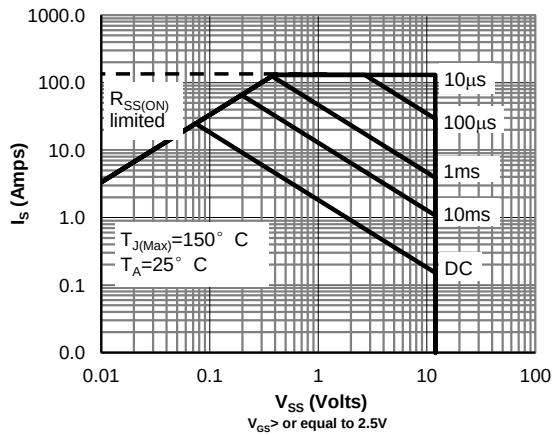


Figure 8: Maximum Forward Biased Safe Operating Area (Note1)

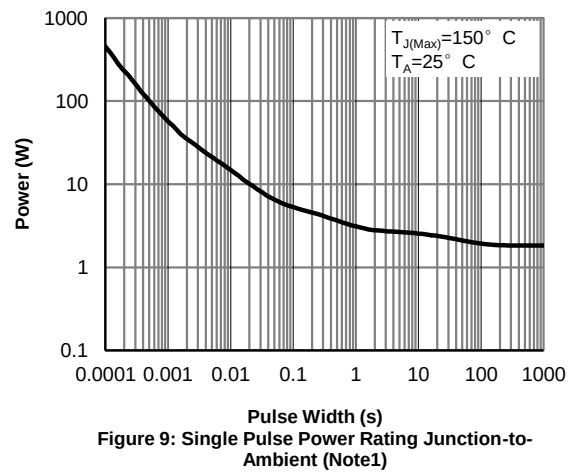


Figure 9: Single Pulse Power Rating Junction-to-Ambient (Note1)

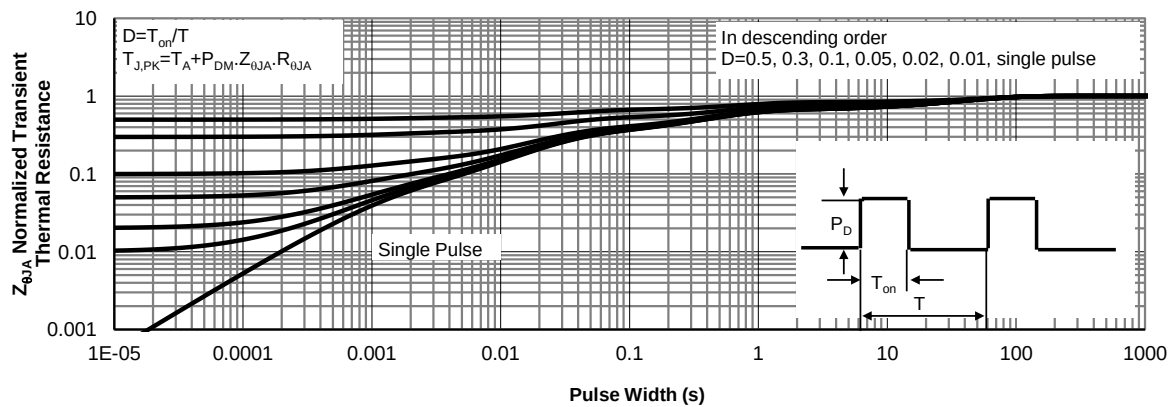
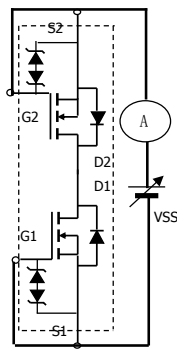


Figure 10: Normalized Maximum Transient Thermal Impedance (Note1)

TEST CIRCUIT 1 I_{SSS}

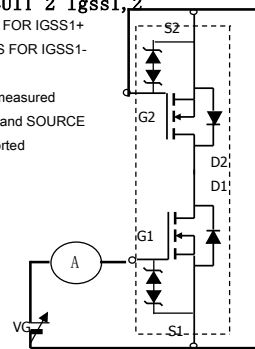
POSITIVE VSS FOR ISSS+
NEGATIVE VSS FOR ISSS-



TEST CIRCUIT 2 $I_{GSS1,2}$

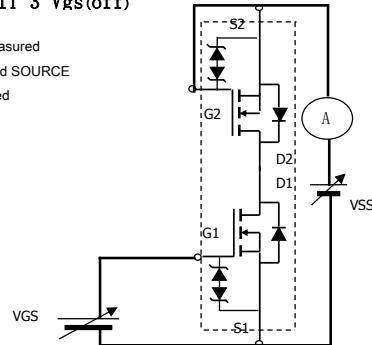
POSITIVE VGS FOR IGSS1+
NEGATIVE VGS FOR IGSS1-

When FET1 is measured
between GATE and SOURCE
of FET2 are shorted



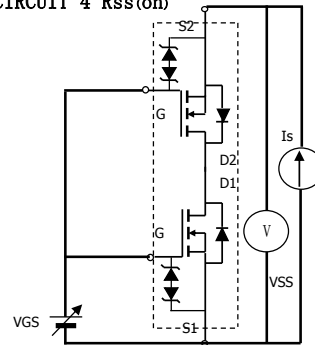
TEST CIRCUIT 3 $V_{GS(off)}$

When FET1 is measured
between GATE and SOURCE
of FET2 are shorted



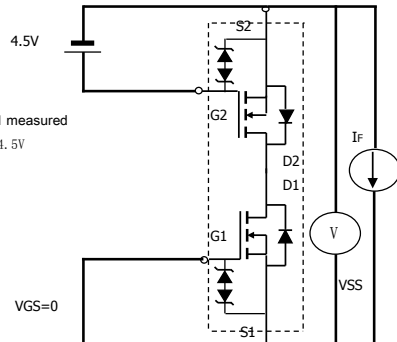
TEST CIRCUIT 4 $R_{SS(on)}$

VSS/Is



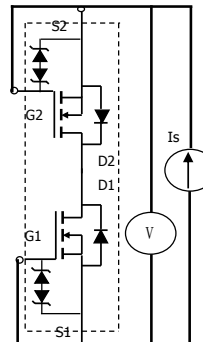
TEST CIRCUIT 5 $V_F(ss)_{1,2}$

When FET1 measured
FET2 $V_{GS}=4.5V$



TEST CIRCUIT 6 BV_{DSS}

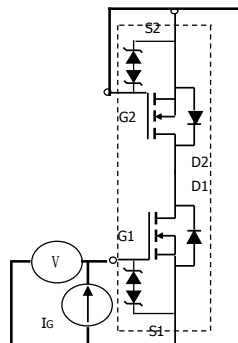
POSITIVE VSS FOR ISSS+
NEGATIVE VSS FOR ISSS-



TEST CIRCUIT 7 $BV_{GS01,2}$

POSITIVE VSS FOR ISSS+
NEGATIVE VSS FOR ISSS-

When FET1 is measured
between GATE and SOURCE
of FET2 are shorted



TEST CIRCUIT 8

Switching time

