



**ALPHA & OMEGA**  
SEMICONDUCTOR

**AOU454**

**N-Channel Enhancement Mode Field Effect Transistor**



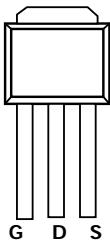
**General Description**

The AOU454 uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications. *Standard Product AOU454 is Pb-free (meets ROHS & Sony 259 specifications). AOU454L is a Green Product ordering option. AOU454 and AOU454L are electrically identical.*

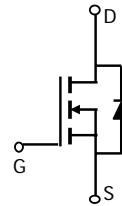
**Features**

$V_{DS}$  (V) = 40V  
 $I_D$  = 12 A ( $V_{GS}$  = 10V)  
 $R_{DS(ON)}$  < 33 m $\Omega$  ( $V_{GS}$  = 10V)  
 $R_{DS(ON)}$  < 47 m $\Omega$  ( $V_{GS}$  = 4.5V)

TO-251



Top View  
 Drain Connected  
 to Tab



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>G</sup>	$I_D$	$T_C=25^\circ\text{C}$	A
		$T_C=100^\circ\text{C}$	
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	30	
Avalanche Current <sup>C</sup>	$I_{AR}$	12	A
Repetitive avalanche energy $L=0.1\text{mH}$ <sup>C</sup>	$E_{AR}$	20	mJ
Power Dissipation <sup>B</sup>	$P_D$	$T_C=25^\circ\text{C}$	W
		$T_C=100^\circ\text{C}$	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 175	$^\circ\text{C}$

**Thermal Characteristics**

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	50	60	$^\circ\text{C/W}$
Maximum Junction-to-Case <sup>B</sup>	$R_{\theta JC}$	4	7.5	$^\circ\text{C/W}$

**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =10mA, V <sub>GS</sub> =0V	40			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =32V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			1 5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1	2.3	3	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =10V, V <sub>DS</sub> =5V	30			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =12A		25	33	mΩ
		T <sub>J</sub> =125°C		39	52	
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =6A		34	47	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =12A		25		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A, V <sub>GS</sub> =0V		0.76	1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				12	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =20V, f=1MHz		404		pF
C <sub>oss</sub>	Output Capacitance			95		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			37		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		2.7		Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub> (10V)	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =20V, I <sub>D</sub> =12A		9.2		nC
Q <sub>g</sub> (4.5V)	Total Gate Charge			4.5		nC
Q <sub>gs</sub>	Gate Source Charge			1.6		nC
Q <sub>gd</sub>	Gate Drain Charge			2.6		nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =10V, V <sub>DS</sub> =20V, R <sub>L</sub> =1.7Ω, R <sub>GEN</sub> =3Ω		3.5		ns
t <sub>r</sub>	Turn-On Rise Time			6		ns
t <sub>D(off)</sub>	Turn-Off DelayTime			13.2		ns
t <sub>f</sub>	Turn-Off Fall Time			3.5		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =12A, dI/dt=100A/μs		22.9		ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =12A, dI/dt=100A/μs		18.3		nC

- A: The value of R<sub>θJA</sub> is measured with the device in a still air environment with T<sub>A</sub>=25°C.
  - B: The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=175°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
  - C: Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=175°C.
  - D: The R<sub>θJA</sub> is the sum of the thermal impedance from junction to case R<sub>θJC</sub> and case to ambient.
  - E: The static characteristics in Figures 1 to 6 are obtained using <300 μs 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<sub>J(MAX)</sub>=175°C.
  - G: The maximum current rating is limited by bond-wires.
- Rev 0 : Aug 2005

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

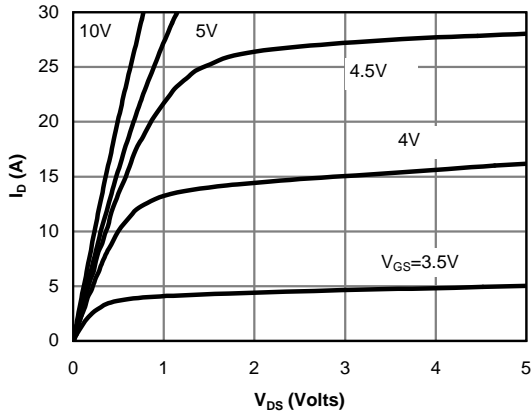


Fig 1: On-Region Characteristics

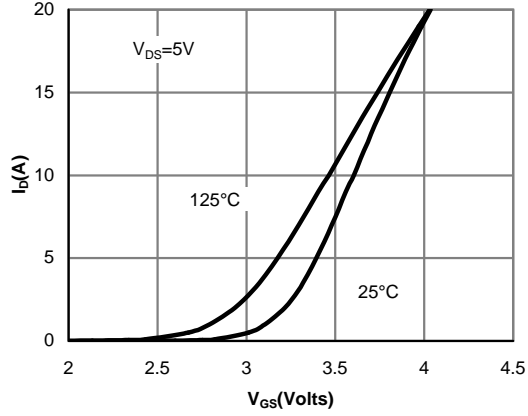


Figure 2: Transfer Characteristics

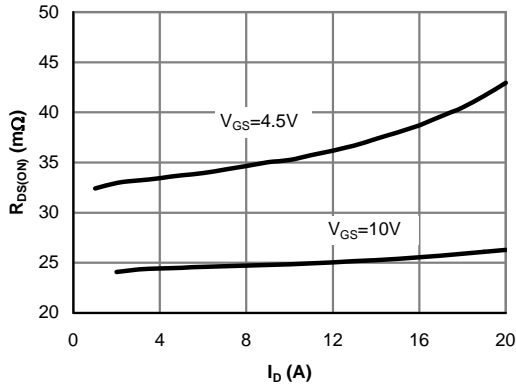


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

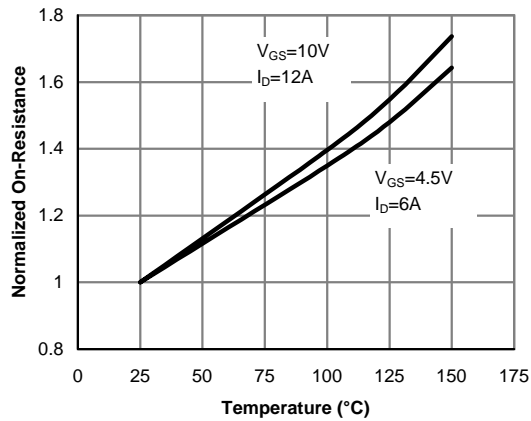


Figure 4: On-Resistance vs. Junction Temperature

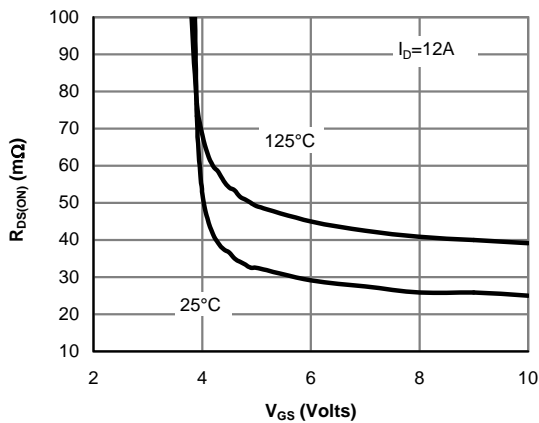


Figure 5: On-Resistance vs. Gate-Source Voltage

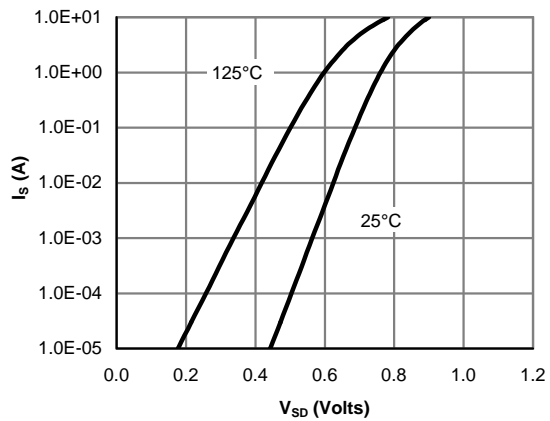


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

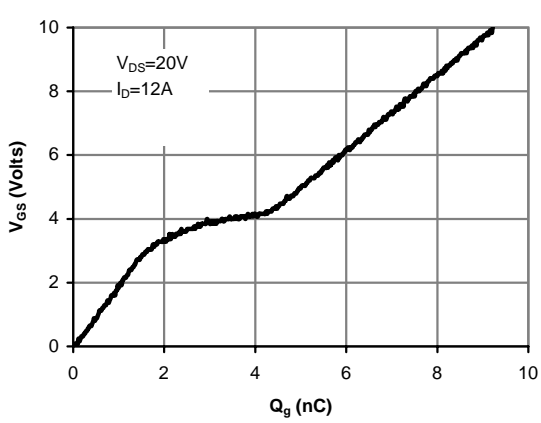


Figure 7: Gate-Charge Characteristics

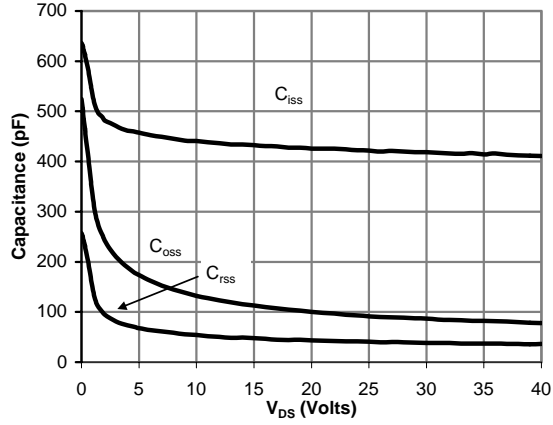


Figure 8: Capacitance Characteristics

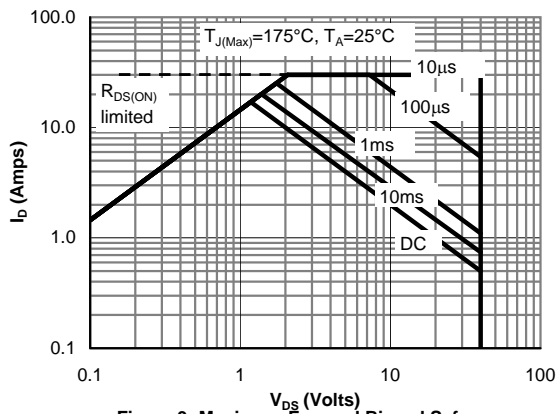


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

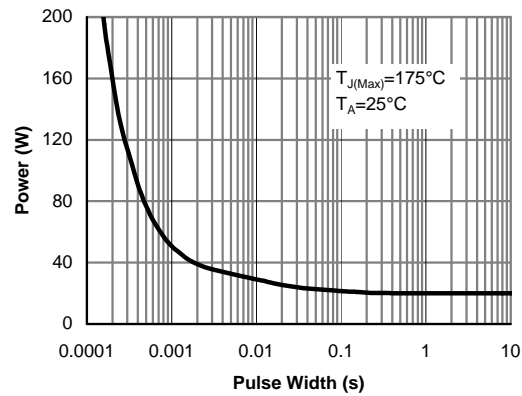


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

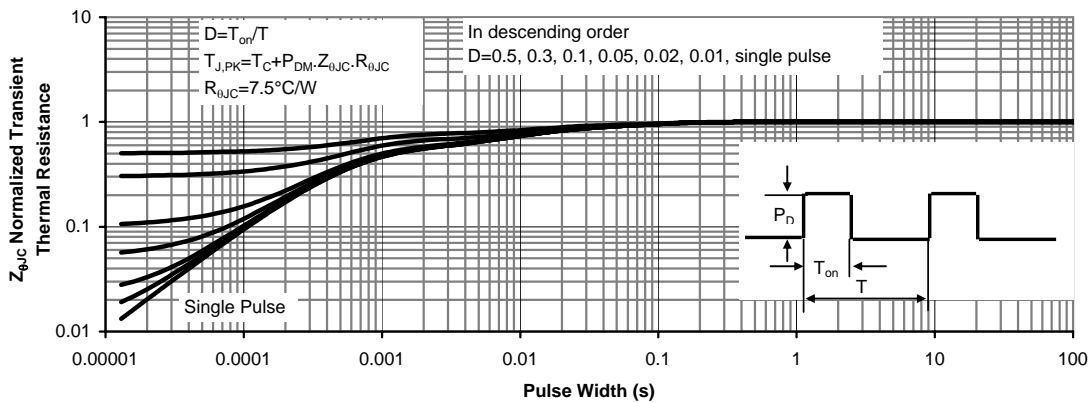


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

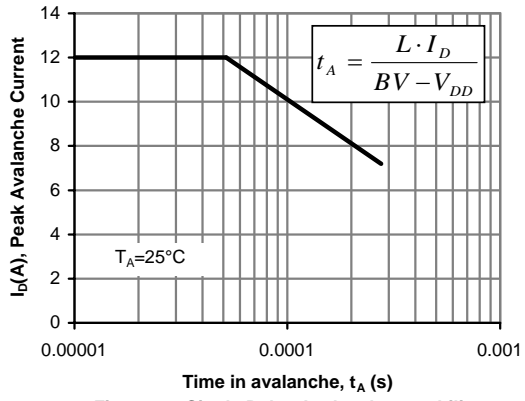


Figure 12: Single Pulse Avalanche capability

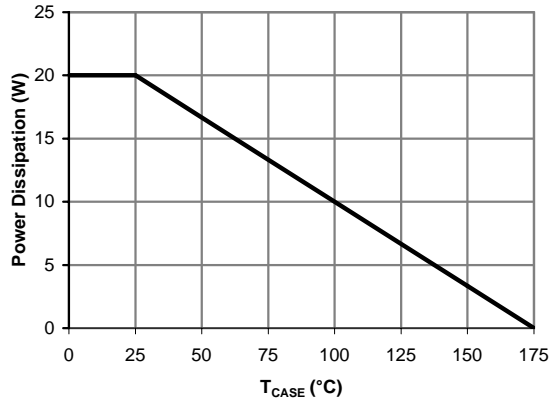


Figure 13: Power De-rating (Note B)

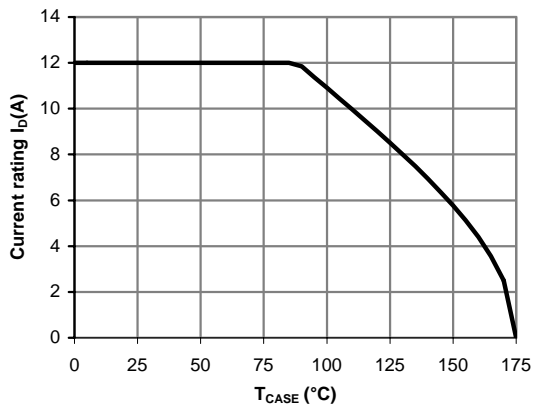


Figure 14: Current De-rating (Note B)