

**AOD607**
**Complementary Enhancement Mode Field Effect Transistor**
**General Description**

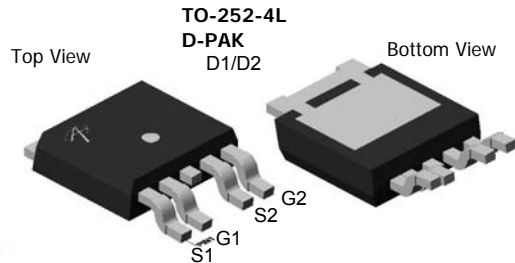
The AOD607 uses advanced trench technology MOSFETs to provide excellent  $R_{DS(ON)}$  and low gate charge. The complementary MOSFETs may be used in H-bridge, Inverters and other applications.

- RoHS Compliant
- Halogen Free\*

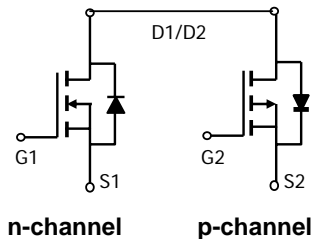
**Features**

n-channel	p-channel
$V_{DS} (V) = 30V$	-30V
$I_D = 12A (V_{GS}=10V)$	-12A ( $V_{GS} = -10V$ )
$R_{DS(ON)}$	$R_{DS(ON)}$
< 25 m $\Omega$ ( $V_{GS}=10V$ )	< 37 m $\Omega$ ( $V_{GS} = -10V$ )
< 34 m $\Omega$ ( $V_{GS}=4.5V$ )	< 62 m $\Omega$ ( $V_{GS} = -4.5V$ )

**100% UIS Tested!**



Top View  
 Drain Connected to Tab


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

Parameter	Symbol	Max n-channel	Max p-channel	Units	
Drain-Source Voltage	$V_{DS}$	30	-30	V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$	$\pm 20$	V	
Continuous Drain Current <sup>G</sup>	$I_D$	$T_C=25^\circ C$	12	-12	A
		$T_C=100^\circ C$	9.4	-9.4	
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	40	-40		
Avalanche Current <sup>C</sup>	$I_{AR}$	18	-18	A	
Repetitive avalanche energy $L=0.1mH$ <sup>C</sup>	$E_{AR}$	40	40	mJ	
Power Dissipation <sup>B</sup>	$P_D$	$T_C=25^\circ C$	25	25	W
		$T_C=100^\circ C$	12.5	12.5	
Power Dissipation <sup>A</sup>	$P_{DSM}$	$T_A=25^\circ C$	2.1	2.1	W
		$T_A=70^\circ C$	1.3	1.3	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 175	-55 to 175	$^\circ C$	

**Thermal Characteristics: n-channel and p-channel**

Parameter	Symbol	Device	Typ	Max	
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	n-ch	19	23	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A</sup>		n-ch	47	60	$^\circ C/W$
Maximum Junction-to-Case <sup>B</sup>	$R_{\theta JC}$	n-ch	4.5	6	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	p-ch	19	23	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A</sup>		p-ch	47	60	$^\circ C/W$
Maximum Junction-to-Case <sup>B</sup>	$R_{\theta JC}$	p-ch	4.5	6	$^\circ C/W$

N-Channel Electrical Characteristics ( $T_J=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	30			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=24\text{V}$ , $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1	$\mu\text{A}$
					5	
$I_{GSS}$	Gate-Body leakage current	$V_{DS}=0\text{V}$ , $V_{GS}=\pm 20\text{V}$			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	1.5	1.7	2.5	V
$I_{D(ON)}$	On state drain current	$V_{GS}=4.5\text{V}$ , $V_{DS}=5\text{V}$	40			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$ , $I_D=12\text{A}$ $T_J=125^\circ\text{C}$		20	25	m $\Omega$
				28	34	
		$V_{GS}=4.5\text{V}$ , $I_D=5\text{A}$		27.5	34	m $\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=5\text{V}$ , $I_D=12\text{A}$		25		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				18	A
$I_{SM}$	Pulsed Body-Diode Current <sup>C</sup>				40	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}$ , $V_{DS}=15\text{V}$ , $f=1\text{MHz}$		1040	1250	pF
$C_{oss}$	Output Capacitance			180		pF
$C_{rss}$	Reverse Transfer Capacitance			110		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}$ , $V_{DS}=0\text{V}$ , $f=1\text{MHz}$		0.7	1.5	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$ , $V_{DS}=15\text{V}$ , $I_D=12\text{A}$		19.8	25	nC
$Q_g(4.5\text{V})$	Total Gate Charge			9.8	12.5	nC
$Q_{gs}$	Gate Source Charge			2.5		nC
$Q_{gd}$	Gate Drain Charge			3.5		nC
$t_{D(on)}$	Turn-On Delay Time			4.5		ns
$t_r$	Turn-On Rise Time	$V_{GS}=10\text{V}$ , $V_{DS}=15\text{V}$ , $R_L=1.25\Omega$ , $R_{GEN}=3\Omega$		3.9		ns
$t_{D(off)}$	Turn-Off Delay Time			17.4		ns
$t_f$	Turn-Off Fall Time			3.2		ns
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=12\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		19	25	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=12\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		8		nC

A: The value of  $R_{\theta JA}$  is measured with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ . The Power dissipation  $P_{DSM}$  is based on  $R_{\theta JA}$  and the maximum allowed junction temperature of  $150^\circ\text{C}$ . The value in any given application depends on the user's specific board design, and the maximum temperature of  $175^\circ\text{C}$  may be used if the PCB allows it.

B. The power dissipation  $P_D$  is based on  $T_{J(MAX)}=175^\circ\text{C}$ , 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  $T_{J(MAX)}=175^\circ\text{C}$ .

D. The  $R_{\theta JA}$  is the sum of the thermal impedance from junction to case  $R_{\theta JC}$  and case 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 tests are performed with the device mounted on 1 in<sup>2</sup> 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.

G. The maximum current rating is limited by bond-wires.

\*This device is guaranteed green after data code 8X11 (Sep 1<sup>ST</sup> 2008).

Rev3: Oct 2008

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N-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

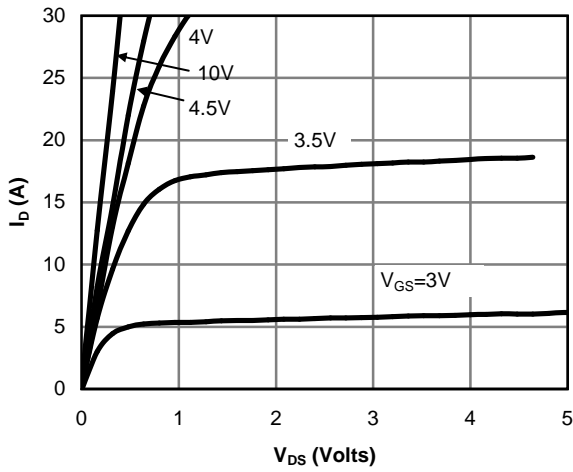


Fig 1: On-Region Characteristics

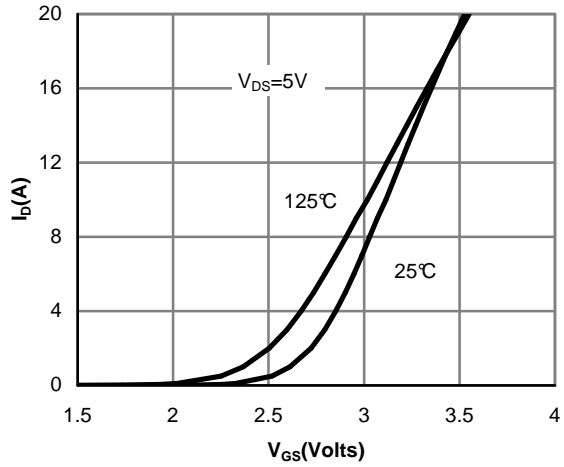


Figure 2: Transfer Characteristics

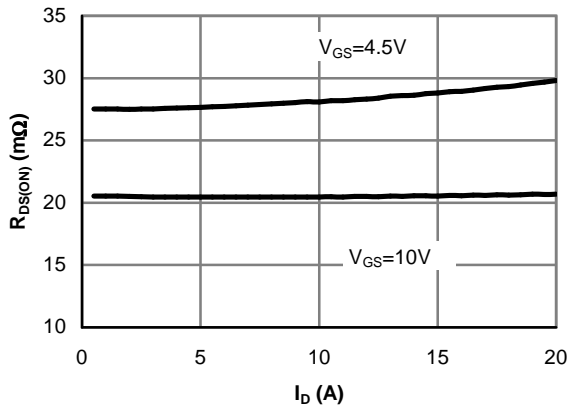


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

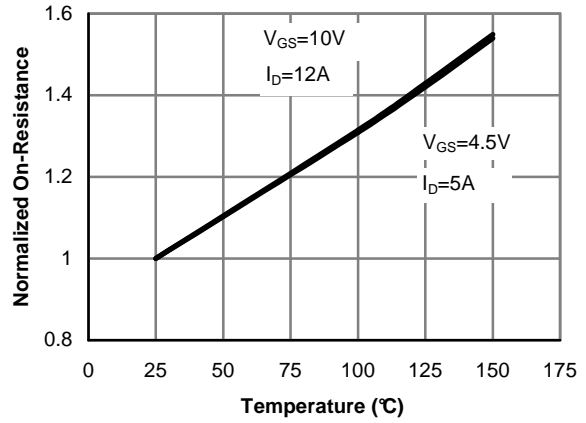


Figure 4: On-Resistance vs. Junction Temperature

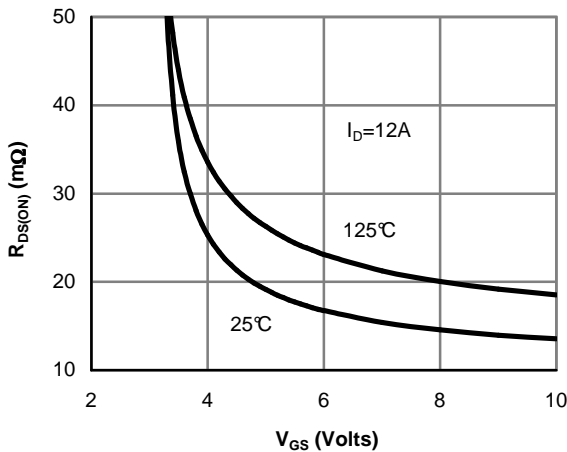


Figure 5: On-Resistance vs. Gate-Source Voltage

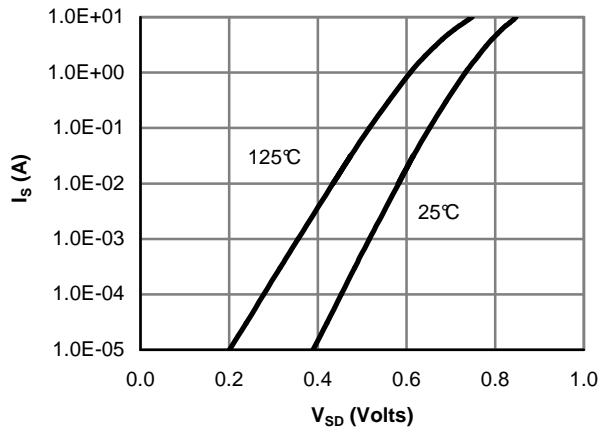


Figure 6: Body-Diode Characteristics

N-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

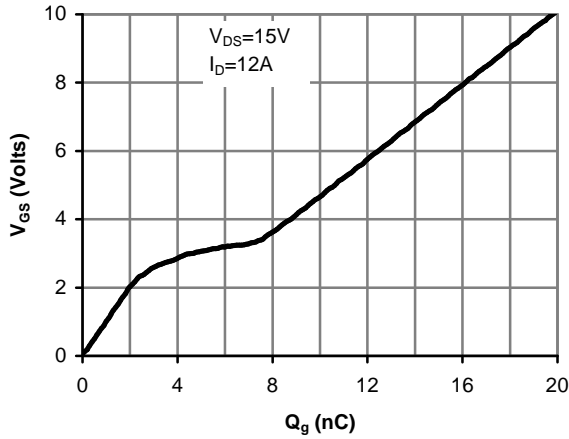


Figure 7: Gate-Charge Characteristics

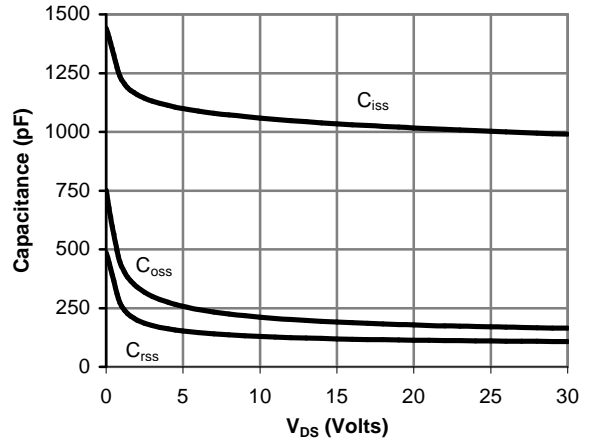


Figure 8: Capacitance Characteristics

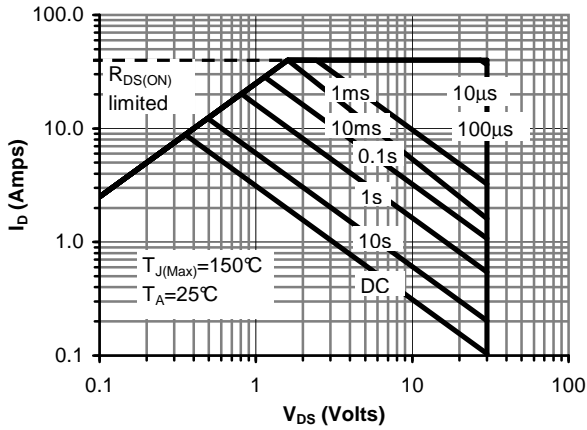


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

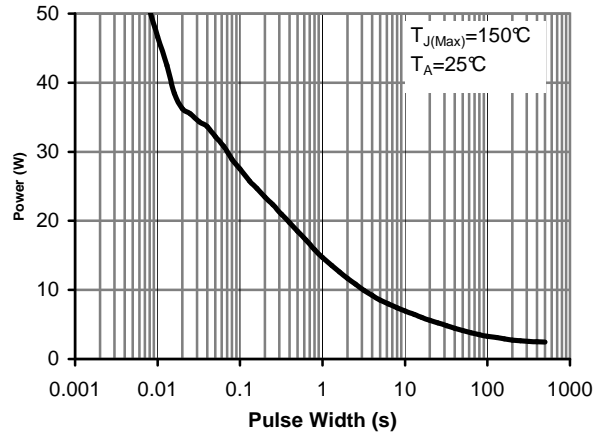


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

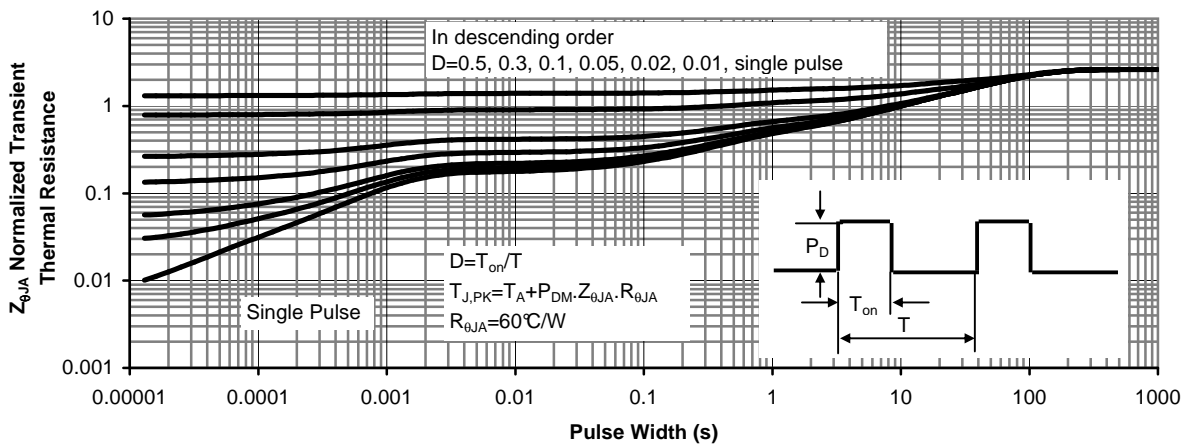


Figure 11: Normalized Maximum Transient Thermal Impedance

P-Channel Electrical Characteristics ( $T_J=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D=-250\mu\text{A}$ , $V_{GS}=0\text{V}$	-30			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-24\text{V}$ , $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$		-0.003	-1	$\mu\text{A}$
$I_{GSS}$	Gate-Body leakage current	$V_{DS}=0\text{V}$ , $V_{GS}=\pm 20\text{V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$ , $I_D=-250\mu\text{A}$	-1.5	-2	-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	$V_{GS}=-10\text{V}$ , $I_D=-12\text{A}$ $T_J=125^\circ\text{C}$		30	37	$\text{m}\Omega$
		$V_{GS}=-4.5\text{V}$ , $I_D=-5\text{A}$		42	50	$\text{m}\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=-5\text{V}$ , $I_D=-12\text{A}$		17		S
$V_{SD}$	Diode Forward Voltage	$I_S=-1\text{A}$ , $V_{GS}=0\text{V}$		-0.76	-1	V
$I_S$	Maximum Body-Diode Continuous Current				-18	A
$I_{SM}$	Pulsed Body-Diode Current <sup>C</sup>				-40	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}$ , $V_{DS}=-15\text{V}$ , $f=1\text{MHz}$		920	1100	pF
$C_{oss}$	Output Capacitance			190		pF
$C_{rss}$	Reverse Transfer Capacitance			122		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}$ , $V_{DS}=0\text{V}$ , $f=1\text{MHz}$		3.6	5	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge (10V)	$V_{GS}=-10\text{V}$ , $V_{DS}=-15\text{V}$ , $I_D=-12\text{A}$		18.7	23	nC
$Q_g(4.5\text{V})$	Total Gate Charge (4.5V)			9.7	11.7	nC
$Q_{gs}$	Gate Source Charge			2.54		nC
$Q_{gd}$	Gate Drain Charge			5.4		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=-10\text{V}$ , $V_{DS}=-15\text{V}$ , $R_L=1.25\Omega$ , $R_{GEN}=3\Omega$		9	13	ns
$t_r$	Turn-On Rise Time			25	35	ns
$t_{D(off)}$	Turn-Off DelayTime			20	30	ns
$t_f$	Turn-Off Fall Time			12	18	ns
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=-12\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		21.4	26	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=-12\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		13	16	nC

A: The value of  $R_{\theta JA}$  is measured with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ . The Power dissipation  $P_{DSM}$  is based on steady-state  $R_{\theta JA}$  and the maximum allowed junction temperature of  $150^\circ\text{C}$ . The value in any given application depends on the user's specific board design, and the maximum temperature fo  $175^\circ\text{C}$  may be u sed if the PCB or heatsink allows it.

B. The power dissipation  $P_D$  is based on  $T_{J(MAX)}=175^\circ\text{C}$ , using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

C: Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)}=175^\circ\text{C}$ .

D. The  $R_{\theta JA}$  is the sum of the thermal impedance from junction to case  $R_{\theta JC}$  and case 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 tests are performed with the device mounted on 1 in<sup>2</sup> 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.

G. The maximum current rating is limited by the package current capability.

\*This device is guaranteed green after data code 8X11 (Sep 1<sup>ST</sup> 2008).

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P-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

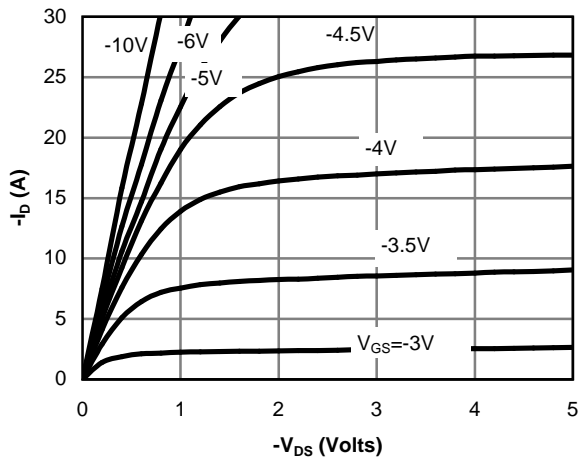


Fig 1: On-Region Characteristics

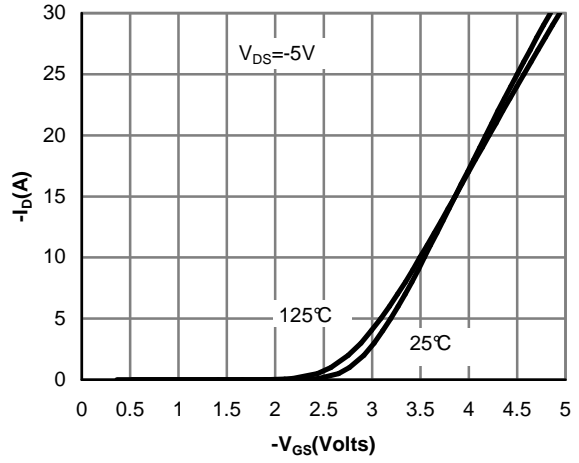


Figure 2: Transfer Characteristics

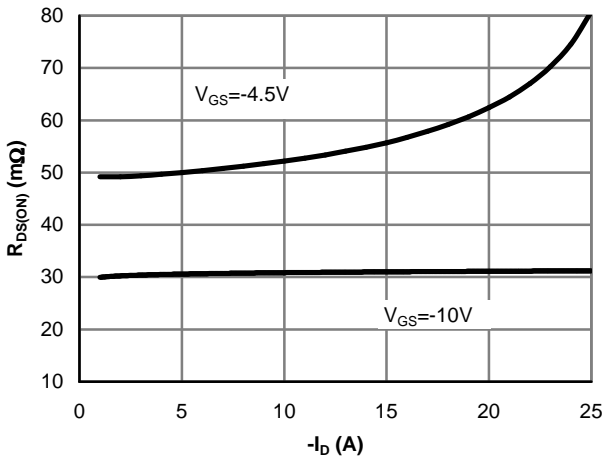


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

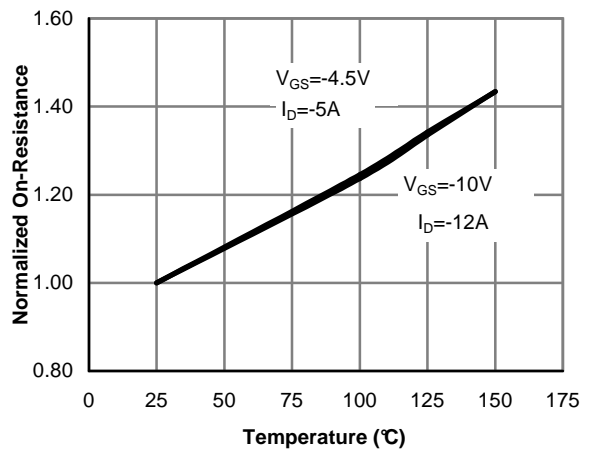


Figure 4: On-Resistance vs. Junction Temperature

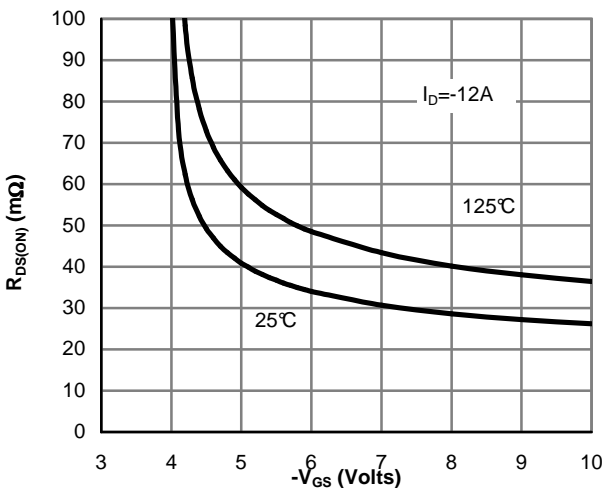


Figure 5: On-Resistance vs. Gate-Source Voltage

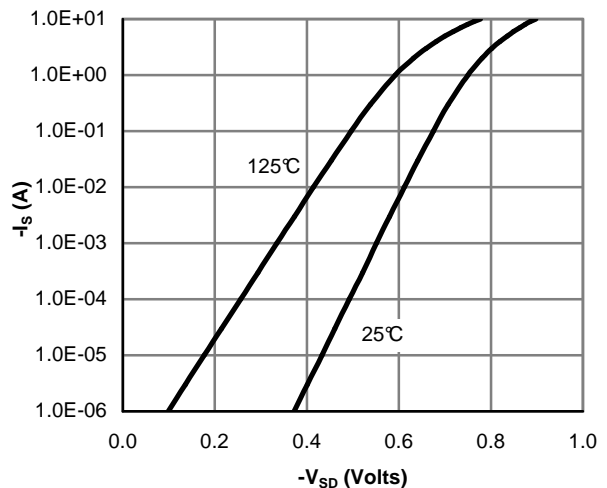


Figure 6: Body-Diode Characteristics

P-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

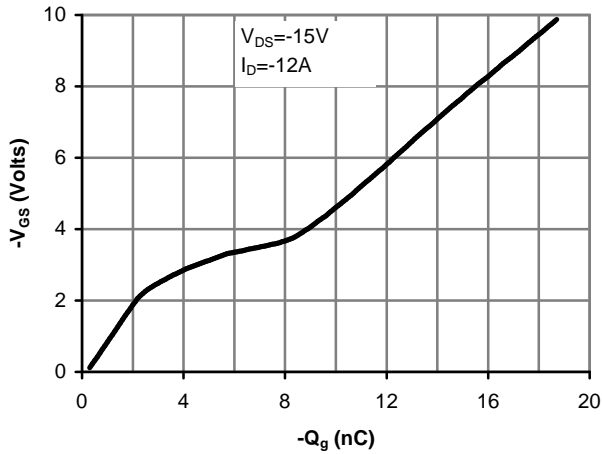


Figure 7: Gate-Charge Characteristics

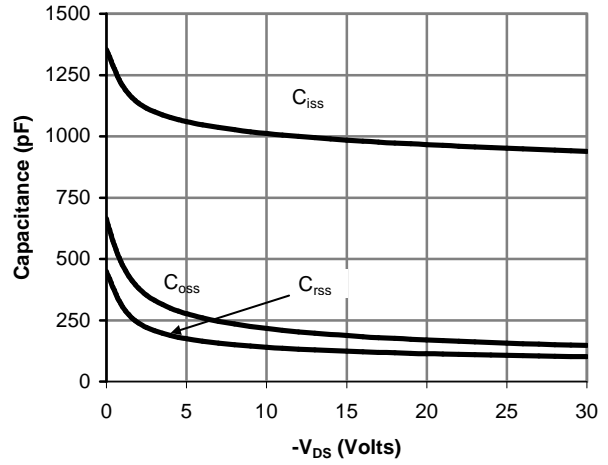


Figure 8: Capacitance Characteristics

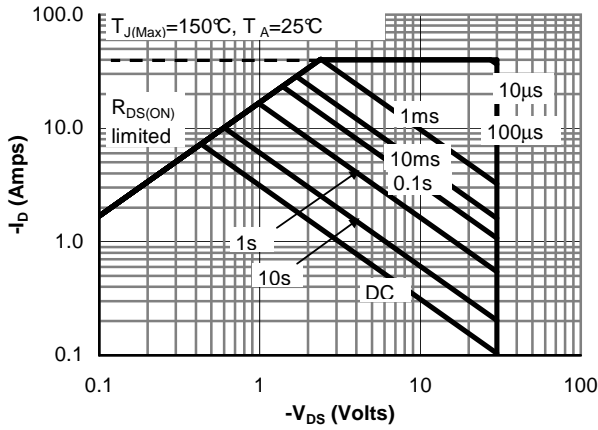


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

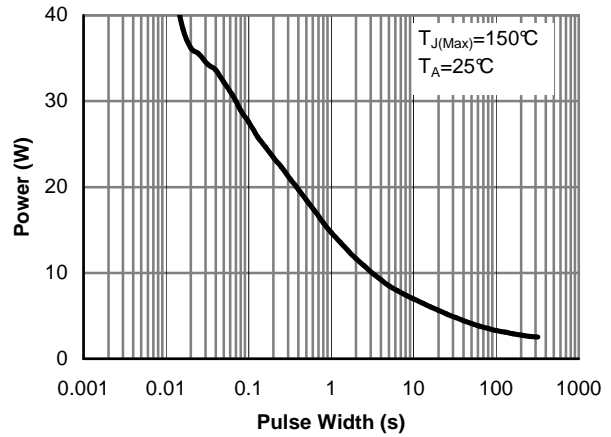


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

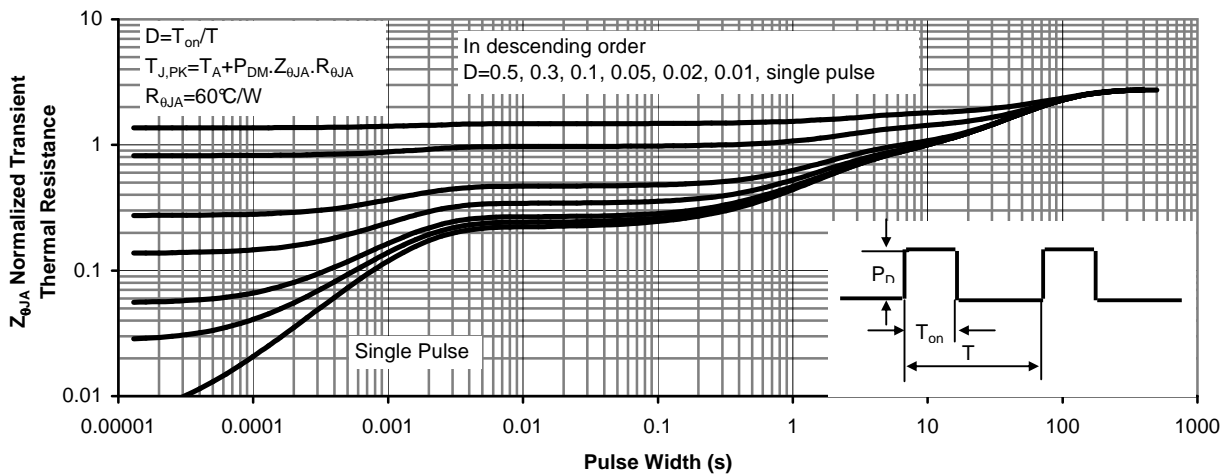
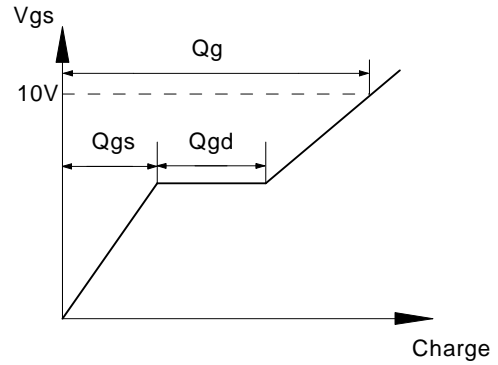
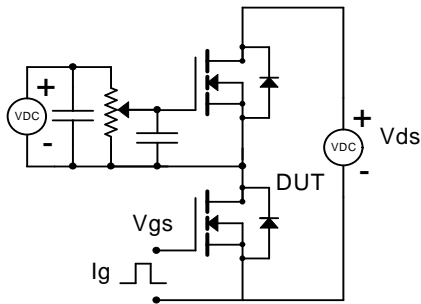
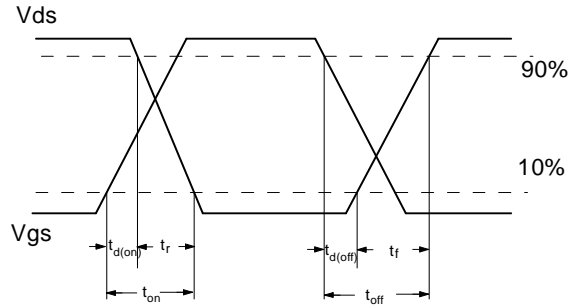
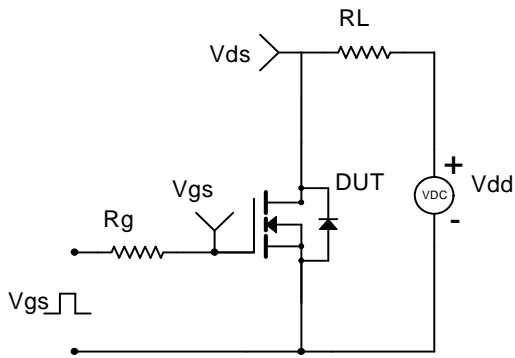


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

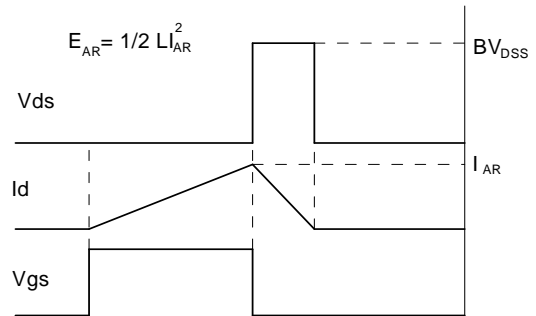
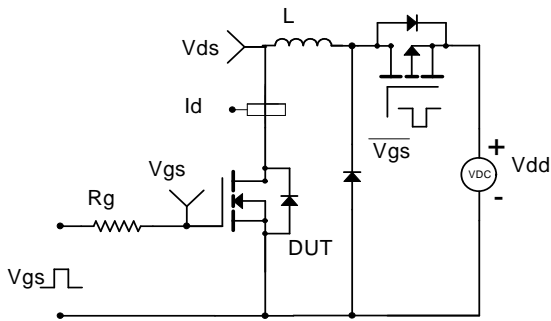
Gate Charge Test Circuit & Waveform



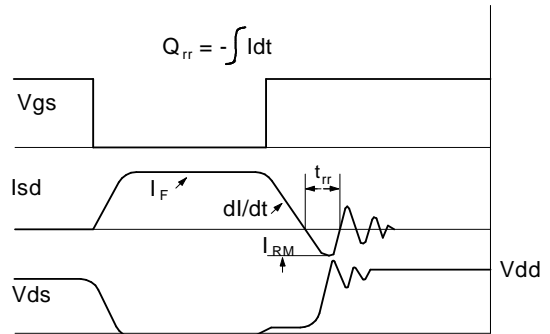
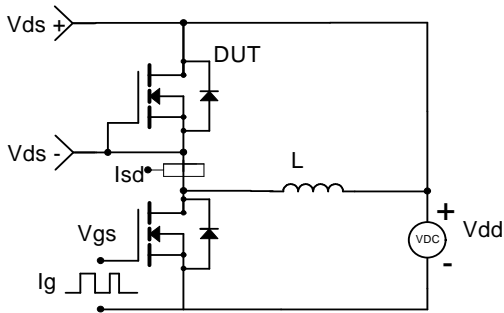
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

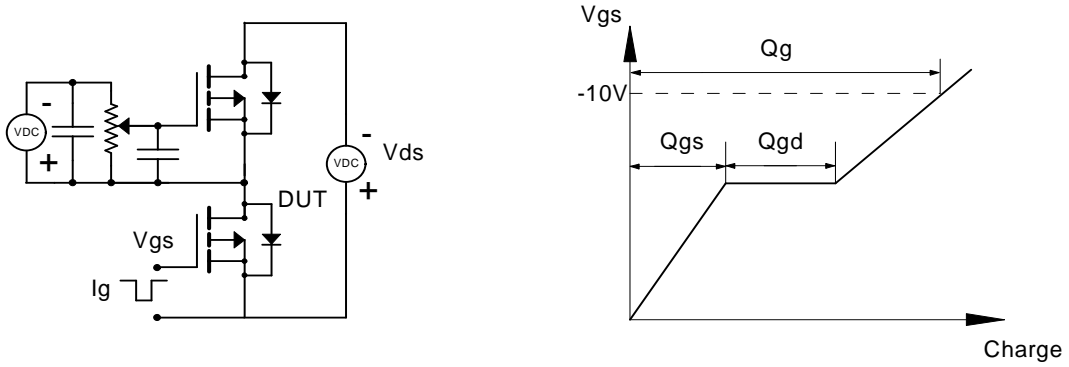


Diode Recovery Test Circuit & Waveforms

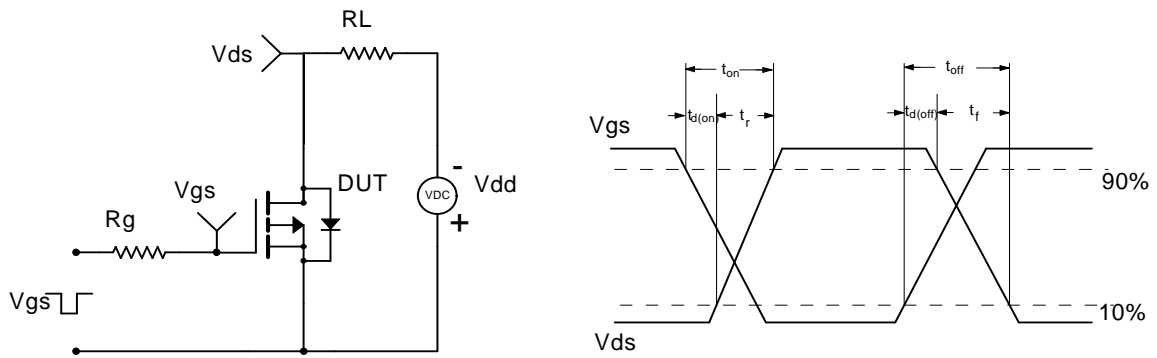




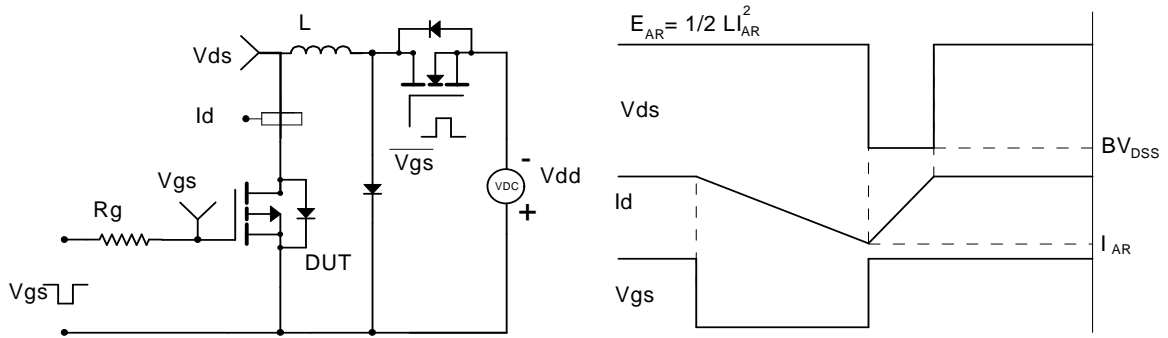
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

