UMW AO6601

Dual 30V N-Channel MOSFET
Dual -30V P-Channel MOSFET

1.Description

The AO6601 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs form a high-speed power inverter, suitable for a multitude of applications

2.1Features (N-Ch)

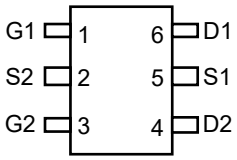
- $V_{DS\ (V)}$=30V, I_D=3.4A(V_{GS}=10V)
- $R_{DS(ON)}$<60mΩ(V_{GS}=10V)
- $R_{DS(ON)}$<70mΩ(V_{GS}=4.5V)
- $R_{DS(ON)}$<90mΩ(V_{GS}=2.5V)

2.2Features (P-Ch)

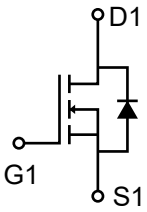
- $V_{DS\ (V)}$=-30V
- I_D=-2.3A(V_{GS}=-10V)
- $R_{DS(ON)}$<115mΩ(V_{GS}=-10V)
- $R_{DS(ON)}$<150mΩ(V_{GS}=-4.5V)
- $R_{DS(ON)}$<200mΩ(V_{GS}=-2.5V)

3.Pinning information

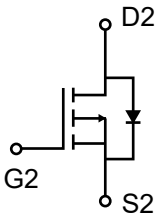
Pin	Symbol	Description
1,3	G1, G2	GATE
5,2	S1, S2	SOURCE
6,4	D1, D2	DRAIN



SOT23-6



n-channel



p-channel

4.Absolute Maximum Ratings T_A= 25°C

Parameter		Symbol	Max n-channel	Max p-channel	Units
Drain-Source Voltage		V_{DS}	30	-30	V
Gate-Source Voltage		V_{GS}	±12	±12	V
Continuous Drain Current	T_A=25°C	I_D	3.4	-2.3	A
	T_A=70°C		2.7	-1.8	
Pulsed Drain Current [C]		I_{DM}	20	-15	
Power Dissipation [B]	T_A=25°C	P_D	1.15	1.15	W
	T_A=70°C		0.73	0.73	W
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	-55 to 150	°C

5.Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient	t ≤ 10s	$R_{\theta JA}$	78	110	°C/W
Maximum Junction-to-Ambient	Steady-State		106	150	°C/W
Maximum Junction-to-Lead	Steady-State	$R_{\theta JL}$	64	80	°C/W

6.Electrical Characteristic (T_J=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	30			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=30V, V_{GS}=0V			1	μA
		T_J=55°C			5	
Gate-Body leakage current	I_{GSS}	V_{DS}=0V, V_{GS}=±12V			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	0.5	1	1.5	V
On state drain current	$I_{D(ON)}$	V_{GS}=10V, V_{DS}=5V	20			A
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=3.4A		46	60	mΩ
		V_{GS}=4.5V, I_D=3A		50	70	mΩ
		V_{GS}=2.5V, I_D=2A		62	90	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V, I_D=3.4A		14		S
Diode Forward Voltage	V_{SD}	I_S=1A, V_{GS}=0V		0.75	1	V
Maximum Body-Diode Continuous Current	I_S				1.5	A
DYNAMIC PARAMETERS						
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=15V, f=1MHz	185	235	285	pF
Output Capacitance	C_{oss}		25	35	45	pF
Reverse Transfer Capacitance	C_{rss}		10	18	25	pF
Gate resistance	R_g	V_{GS}=0V, V_{DS}=0V, f=1MHz	0.9	1.8	2.7	Ω
SWITCHING PARAMETERS						
Total Gate Charge	Q_g(10V)	V_{GS}=10V, V_{DS}=15V, I_D=3.4A		10	12	nC
Total Gate Charge	Q_g(4.5V)			4.7	6	nC
Gate Source Charge	Q_{gs}			0.95		nC
Gate Drain Charge	Q_{gd}			1.6		nC
Turn-On DelayTime	$t_{D(on)}$	R_{GEN}=3Ω		3.5		ns
Turn-Off DelayTime	$t_{D(off)}$			17.5		ns
Turn-Off Fall Time	t_f			2.5		ns
Body Diode Reverse Recovery Time	t_{rr}	I_F=3.4A, dI/dt=100A/μs		8.5	12	ns
Body Diode Reverse Recovery Charge	Q_{rr}	I_F=3.4A, dI/dt=100A/μs		2.55	4	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°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 $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ 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 impedence 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°C. The SOA curve provides a single pulse rating

7.1Typical characteristic

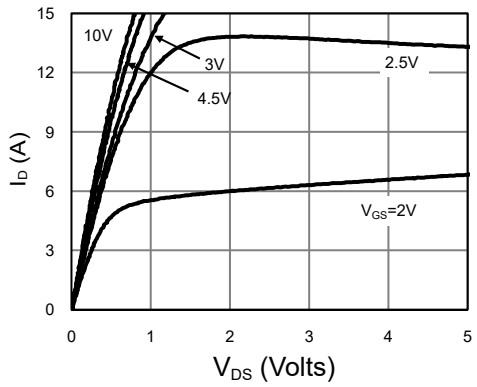


Figure 1: On-Region Characteristics(Note E)

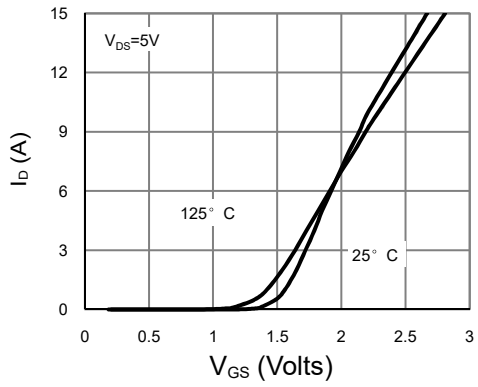


Figure 2: Transfer Characteristics(Note E)

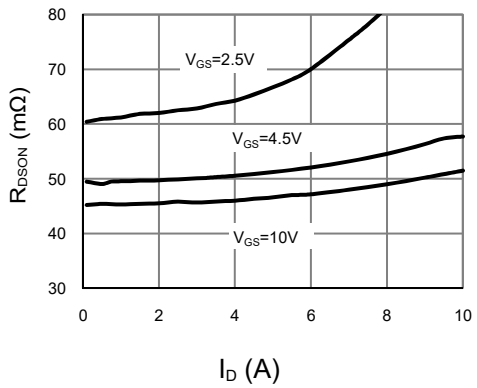


Figure 3: On-Resistance vs. Drain Current and Gate Voltage(Note E)

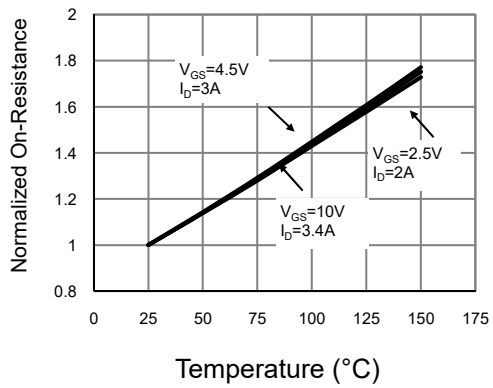


Figure 4: On-Resistance vs. Junction Temperature(Note E)

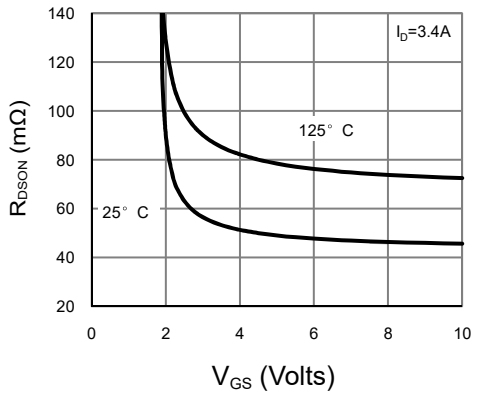


Figure 5: On-Resistance vs. Gate-Source Voltage(Note E)

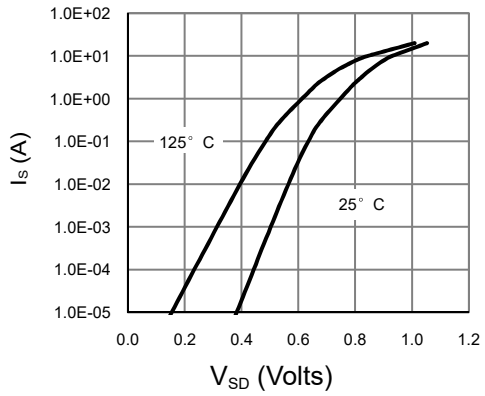


Figure 6: Body-Diode Characteristics(Note E)

7.2Typical characteristic

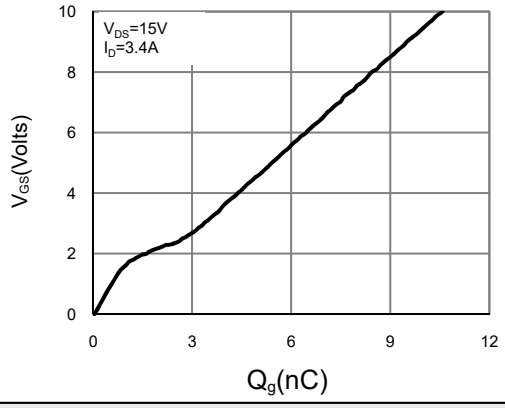


Figure 7: Gate-Charge Characteristics

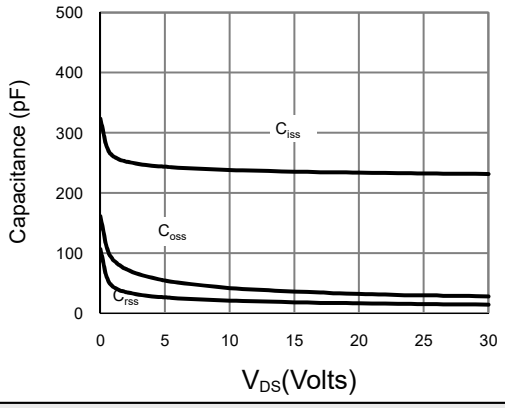


Figure 8: Capacitance Characteristics

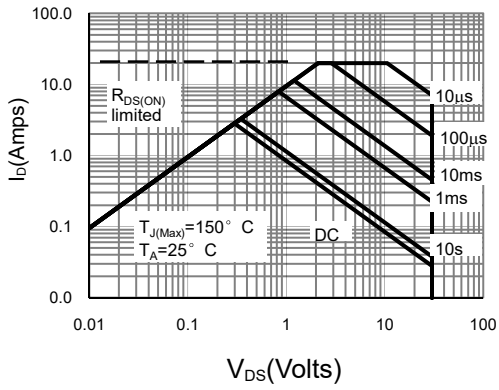


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

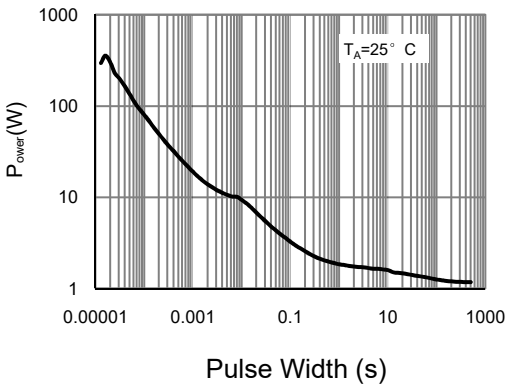


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

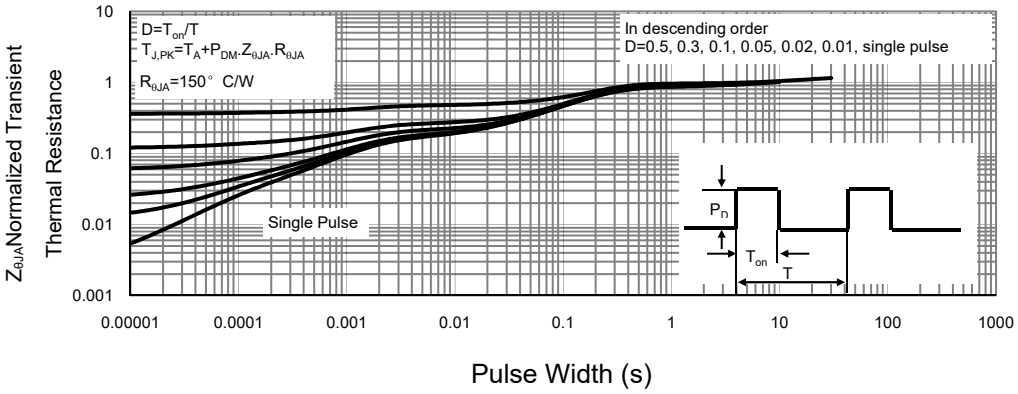
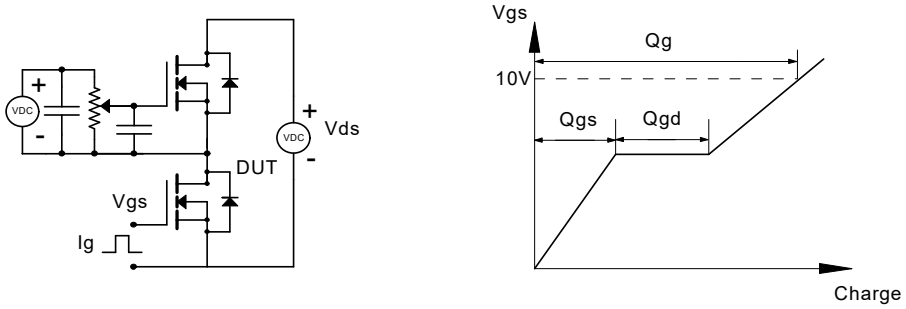


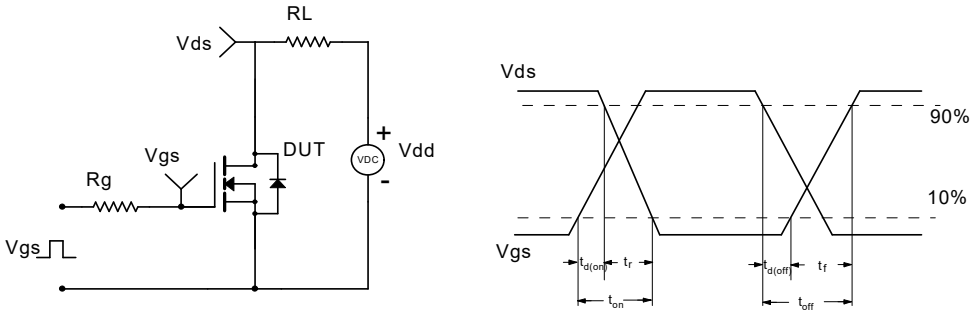
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

7.3Typical characteristic

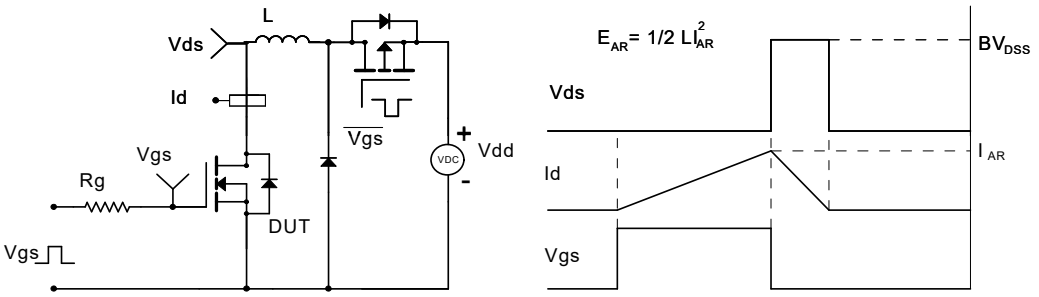
Gate Charge Test Circuit & Waveform



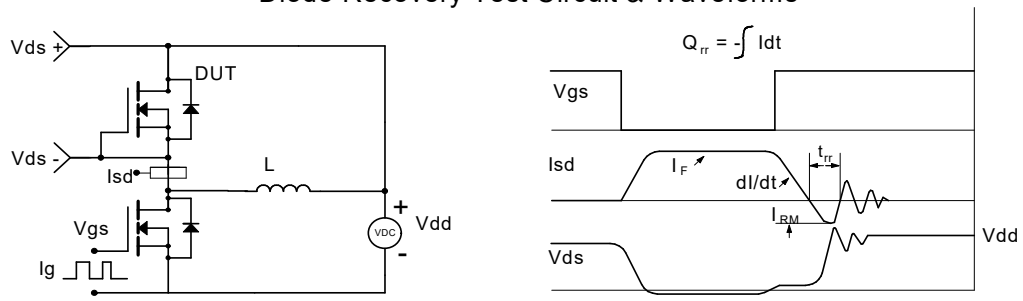
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



8.Electrical Characteristic (T_J=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=-250μA, V_{GS}=0V	-30			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-30V, V_{GS}=0V			-1	μA
Gate-Body leakage current	I_{GSS}	V_{DS}=0V, V_{GS}=±12V			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-0.6	-1	-1.4	V
On state drain current	$I_{D(ON)}$	V_{GS}=-10V, V_{DS}=-5V	-15			A
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-2.3A		88	115	mΩ
		V_{GS}=-4.5V, I_D=-2A		103	150	mΩ
		V_{GS}=-2.5V, I_D=-1A		139	200	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-5V, I_D=-2.3A		8		S
Diode Forward Voltage	V_{SD}	I_S=-1A, V_{GS}=0V		-0.78	-1	V
Maximum Body-Diode Continuous Current	I_S				-1.5	A
DYNAMIC PARAMETERS						
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=-15V, f=1MHz	205	260	315	pF
Output Capacitance	C_{oss}		25	37	50	pF
Reverse Transfer Capacitance	C_{rss}		10	20	30	pF
Gate resistance	R_g	V_{GS}=0V, V_{DS}=0V, f=1MHz	4	8	12	Ω
SWITCHING PARAMETERS						
Total Gate Charge	Q_g(10V)	V_{GS}=10V, V_{DS}=-15V, I_D=-2.3A	4.5	5.9	7	nC
Total Gate Charge	Q_g(4.5V)		2	2.8	4	nC
Gate Source Charge	Q_{gs}			0.7		nC
Gate Drain Charge	Q_{gd}			1		nC
Turn-On DelayTime	$t_{D(on)}$	R_{GEN}=3Ω		6		ns
Turn-Off DelayTime	$t_{D(off)}$			20		ns
Turn-Off Fall Time	t_f			5		ns
Body Diode Reverse Recovery Time	t_{rr}	I_F=-2.3A, dI/dt=100A/μs		11.5	15	ns
Body Diode Reverse Recovery Charge	Q_{rr}	I_F=-2.3A, dI/dt=100A/μs		4.5	6	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°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 $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ 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 impedence 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°C. The SOA curve provides a single pulse rating

9.1Typical characteristic

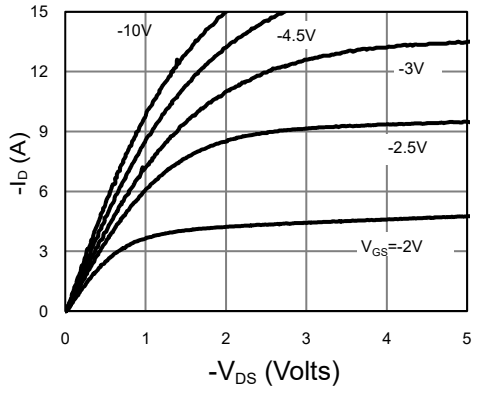


Figure 1: On-Region Characteristics(Note E)

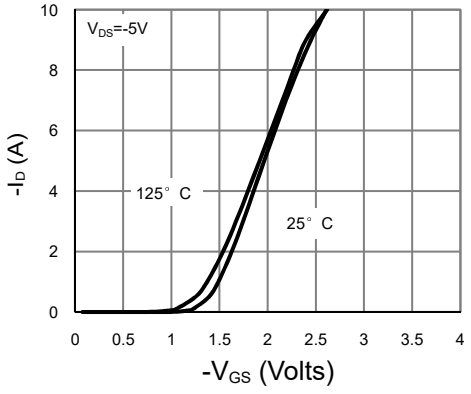


Figure 2: Transfer Characteristics(Note E)

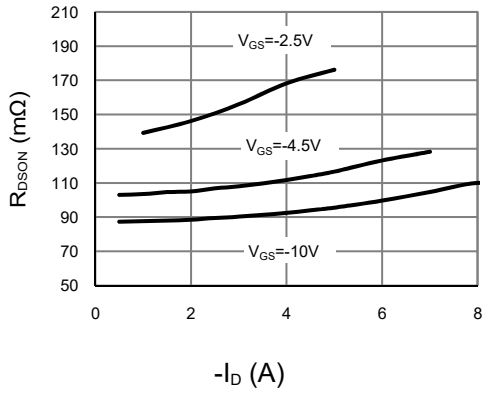


Figure 3: On-Resistance vs. Drain Current and Gate Voltage(Note E)

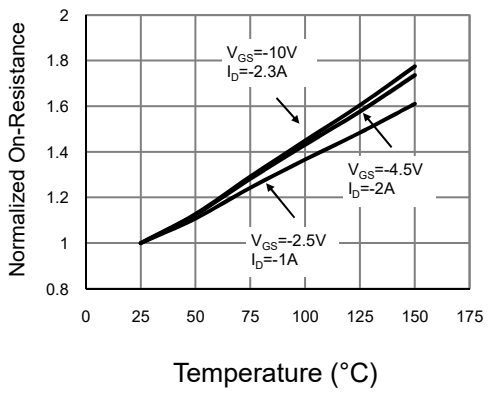


Figure 4: On-Resistance vs. Junction Temperature(Note E)

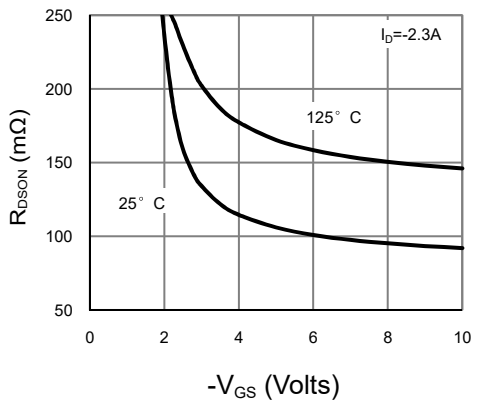


Figure 5: On-Resistance vs. Gate-Source Voltage(Note E)

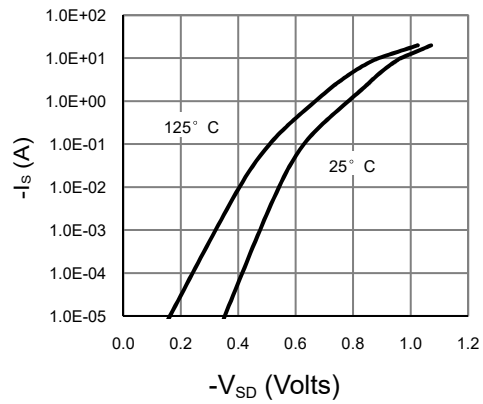


Figure 6: Body-Diode Characteristics(Note E)

9.2Typical characteristic

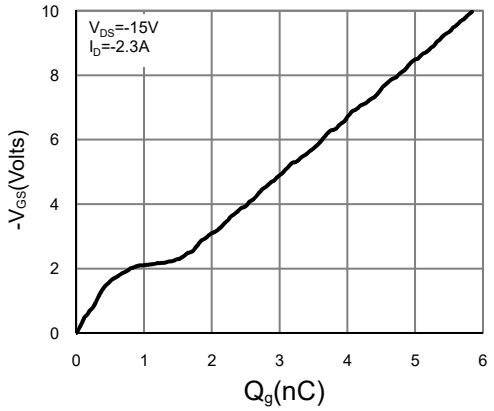


Figure 7: Gate-Charge Characteristics

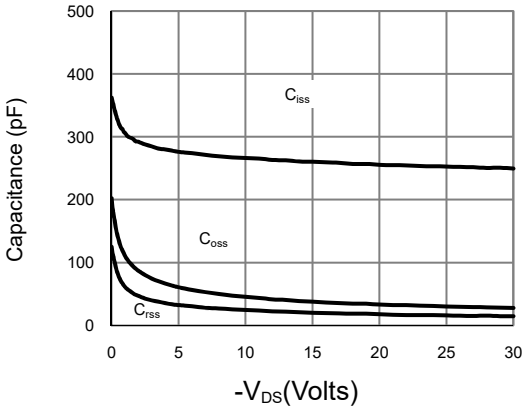


Figure 8: Capacitance Characteristics

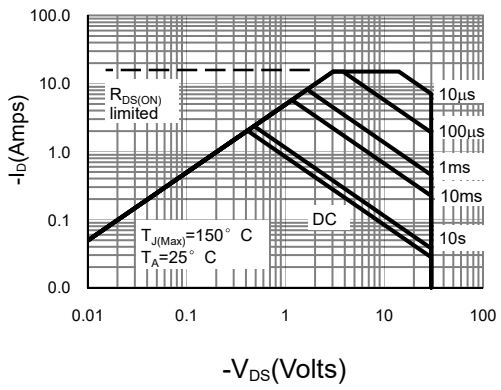


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

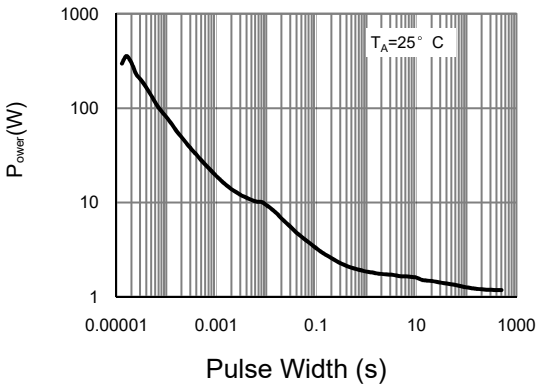


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

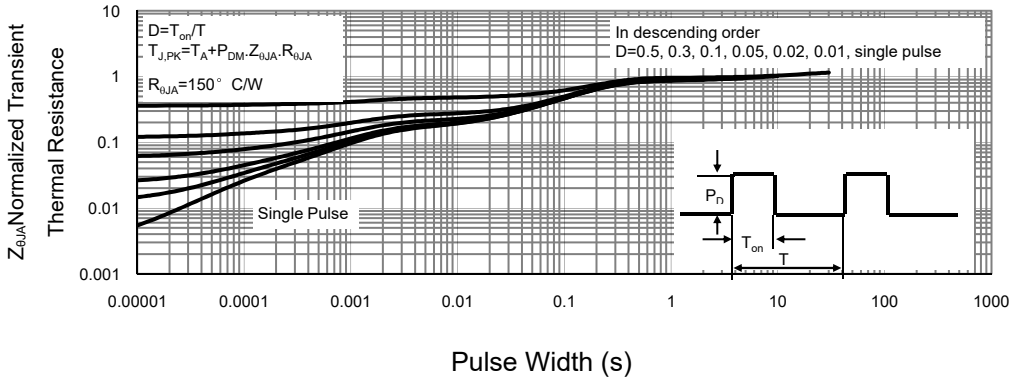
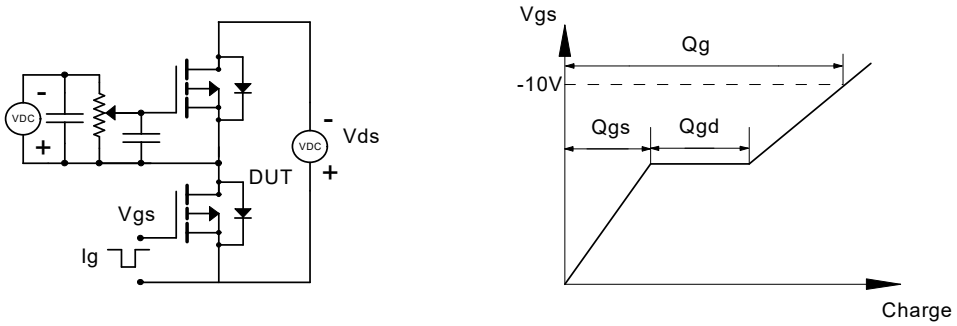


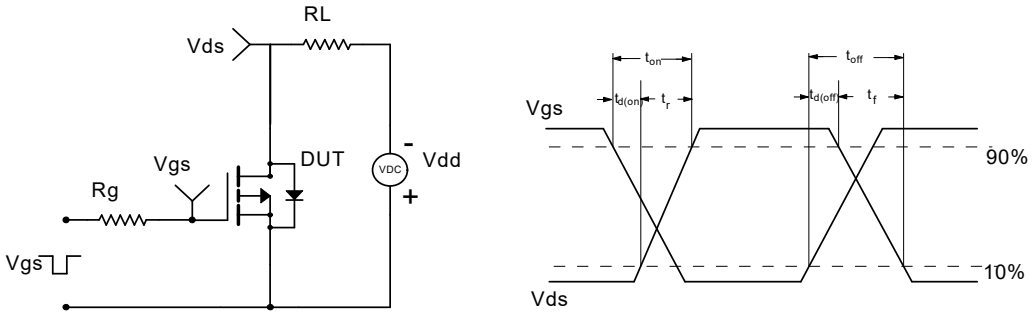
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

9.3Typical characteristic

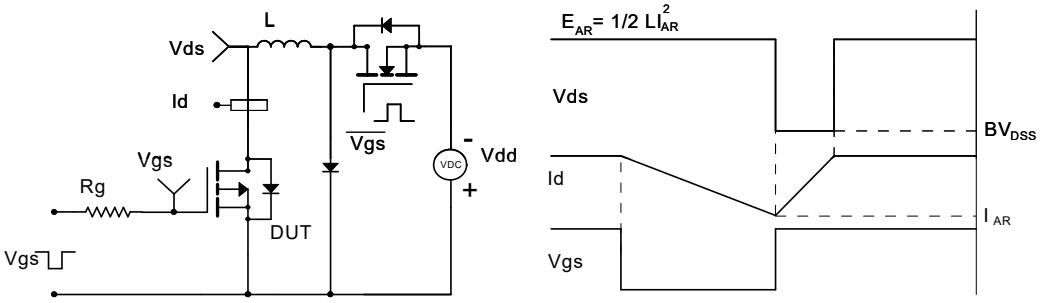
Gate Charge Test Circuit & Waveform



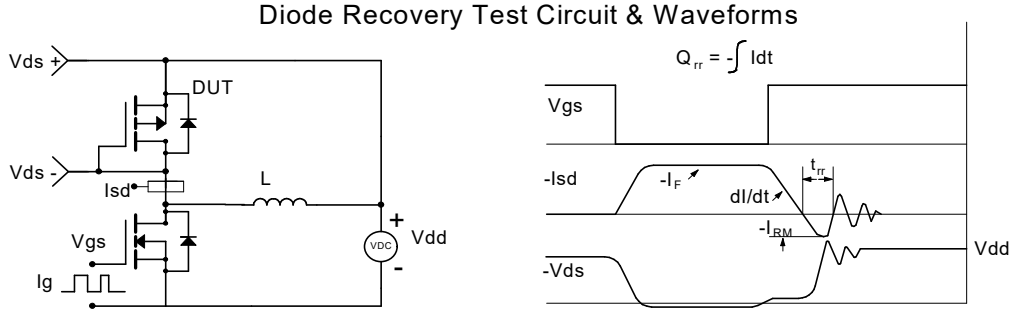
Resistive Switching Test Circuit & Waveforms



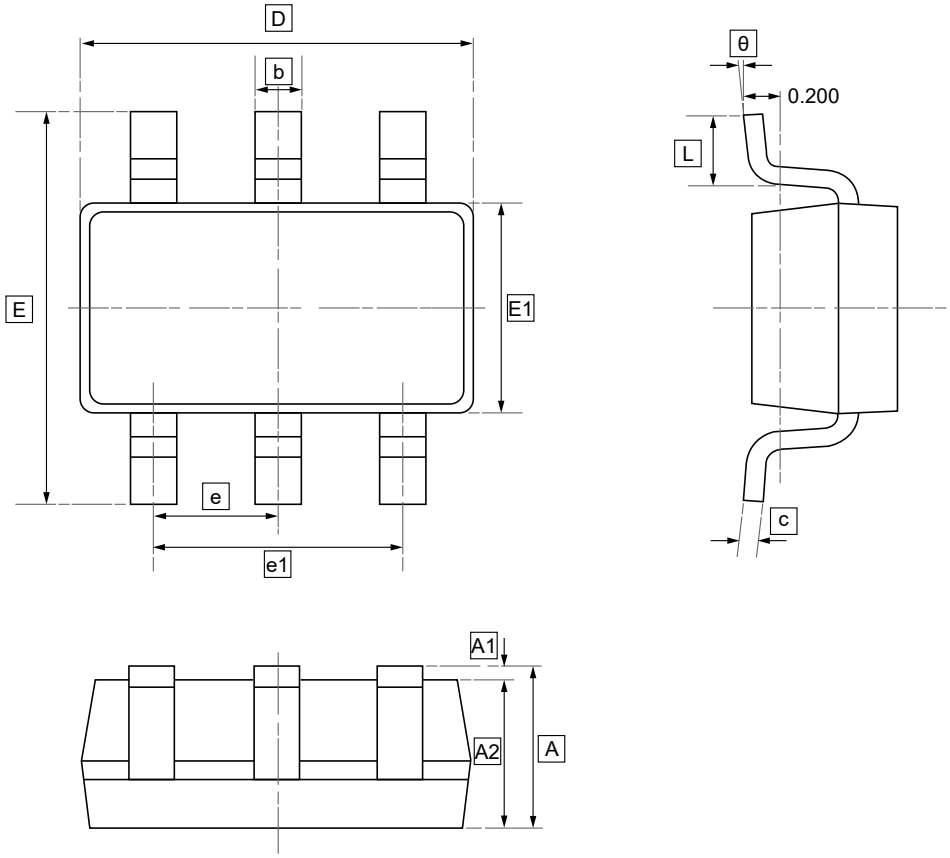
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



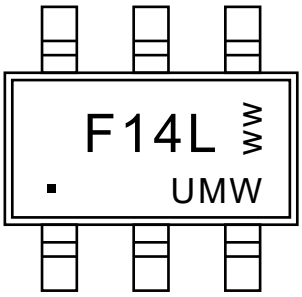
10.SOT23-6 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	b	c	D	E1	E	e	e1	L	θ
Min	1.050	0.000	1.050	0.300	0.100	2.820	1.500	2.650	0.950	1.800	0.300	0°
Max	1.250	0.100	1.150	0.500	0.200	3.020	1.700	2.950	BSC	2.000	0.600	8°

11.Ordering information



ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW AO6601	SOT23-6	3000	Tape and reel

12.Disclaimer

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