General Description

The 6616A uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch.

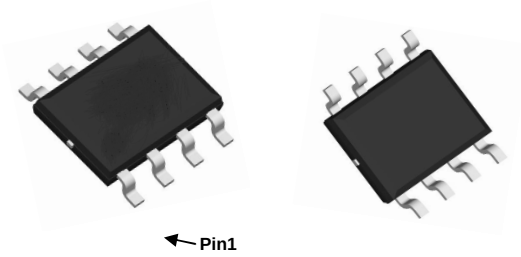
Product Summary

V_{DSS}	$R_{DS(ON)}$ @-4.5V(Typ)	$R_{DS(ON)}$ @-2.5V(Typ)	I_D
-12V	17 mΩ	21mΩ	-16A

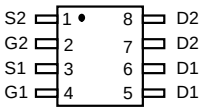
- High power and current handing capability
- RoHS Compliant
- Surface mount package

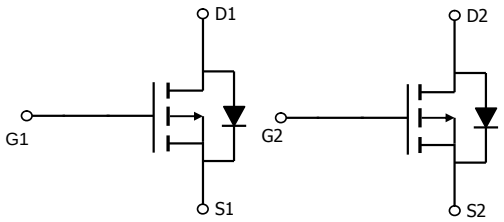
- PWM applications
- Load switch

SOIC-8



Top View





Ordering Information

Part Number	Marking	Case	Packaging
6616A	6616A	SOP-8	2500pcs/Reel

Absolute Maximum Ratings T_A=25℃ unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	-12	V
Gate-Source Voltage		V_{GS}	±8	V
Continuous Drain Current	T_A=25℃	I_D	-16	A
	T_A=70℃		-12	
Pulsed Drain Current [C]		I_{DM}	-105	
Power Dissipation [B]	T_A=25℃	P_D	3	W
	T_A=70℃		1.6	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	℃

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	48	62.5	℃/W
Maximum Junction-to-Ambient [A D]	Steady-State		74	90	℃/W
Maximum Junction-to-Lead	Steady-State	$R_{\theta JL}$	32	40	℃/W

Electrical Characteristics (T_J=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=-250μA, V_{GS}=0V	-12			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-12V, V_{GS}=0V			-1	μA
		T_J=55℃			-5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}= ±8V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=-250μA	-0.4	-0.7	-1.0	V
$I_{D(ON)}$	On state drain current	V_{GS}=-4.5V, V_{DS}=-5V	-60			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-4.5V, I_D=-9A		17	21	mΩ
		T_J=125°C		20	25	
		V_{GS}=-2.5V, I_D=-6.2A		21	27	mΩ
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-9A		45		S
V_{SD}	Diode Forward Voltage	I_S=-1A,V_{GS}=0V		-0.56	-1	V
I_S	Maximum Body-Diode Continuous Current				-3	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-6V, f=1MHz	1390	1740	2100	pF
C_{oss}	Output Capacitance		230	334	435	pF
C_{rss}	Reverse Transfer Capacitance		120	200	280	pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	0.9	1.3	1.7	kΩ
SWITCHING PARAMETERS						
Q_g(4.5V)	Total Gate Charge	V_{GS}=-4.5V, V_{DS}=-6V, I_D=-9A	15	19	23	nC
Q_{gs}	Gate Source Charge		3.6	4.5	5.4	nC
Q_{gd}	Gate Drain Charge		3	5.3	7.4	nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=-4.5V, V_{DS}=-6V, R_L=0.67Ω, R_{GEN}=3Ω		240		ns
t_r	Turn-On Rise Time			580		ns
$t_{D(off)}$	Turn-Off DelayTime			7		μs
t_f	Turn-Off Fall Time			4.2		μs
t_{rr}	Body Diode Reverse Recovery Time	I_F=-9A, dI/dt=500A/μs	18	22	26	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=-9A, dI/dt=500A/μs	14	17	20	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℃. 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℃, using ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150℃. Ratings are based on low frequency and duty cycles to keep initialT_J=25℃.

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℃. The SOA curve provides a single pulse ratin g.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

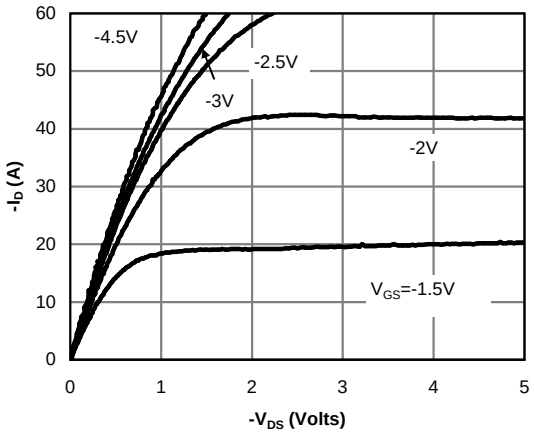


Fig 1: On-Region Characteristics (Note E)

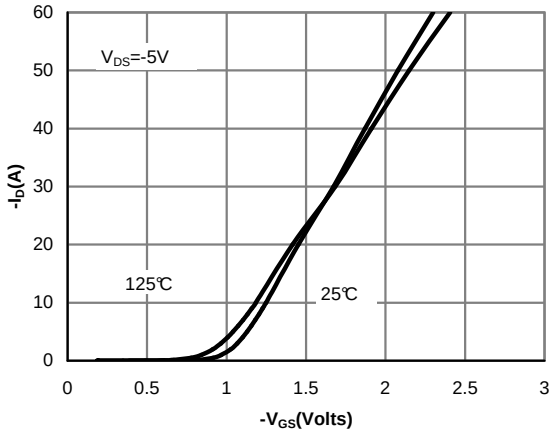


Figure 2: Transfer Characteristics (Note E)

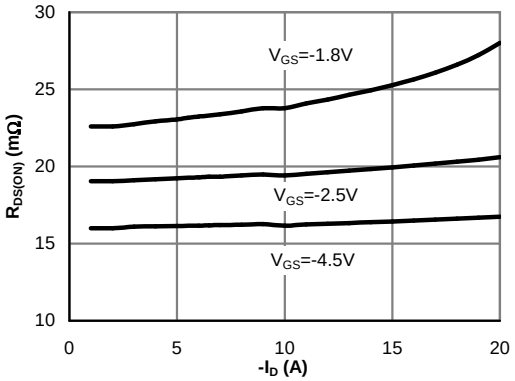


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

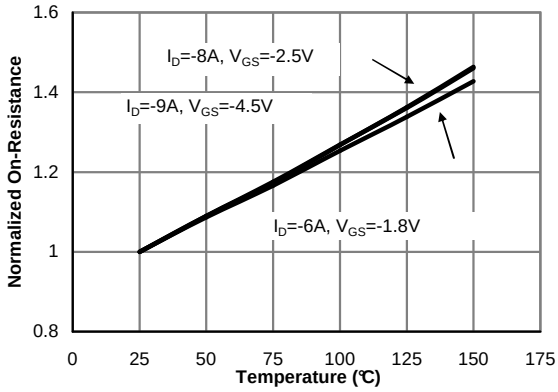


Figure 4: On-Resistance vs. Junction Temperature (Note E)

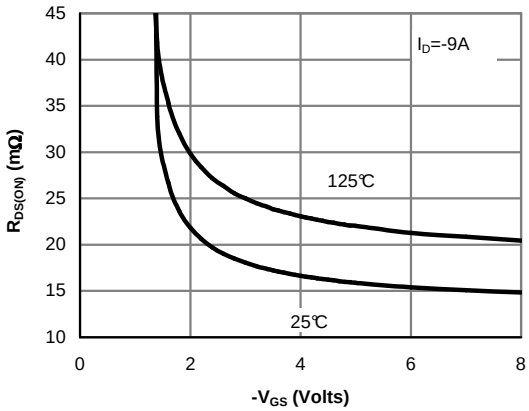


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

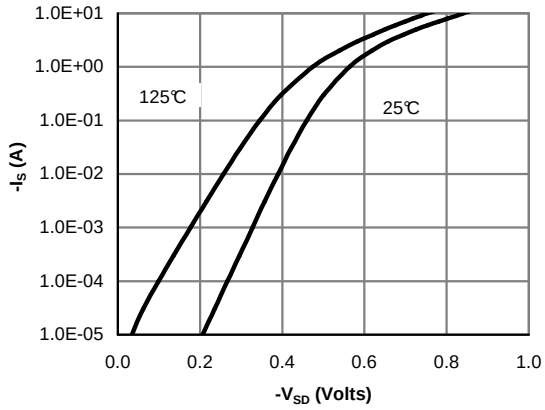


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

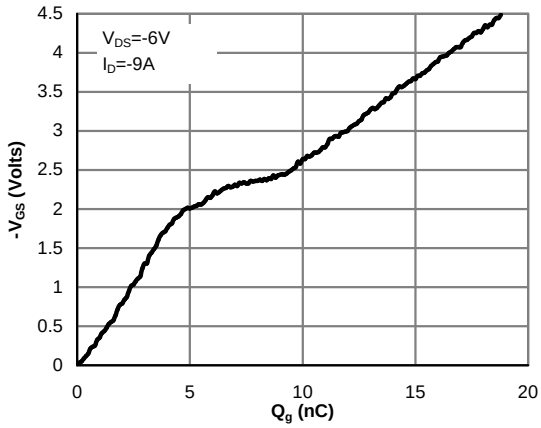


Figure 7: Gate-Charge Characteristics

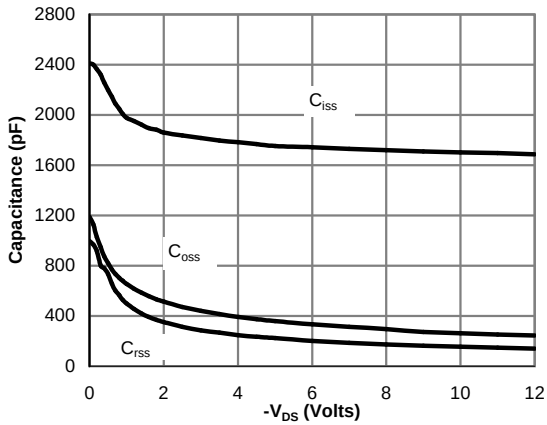


Figure 8: Capacitance Characteristics

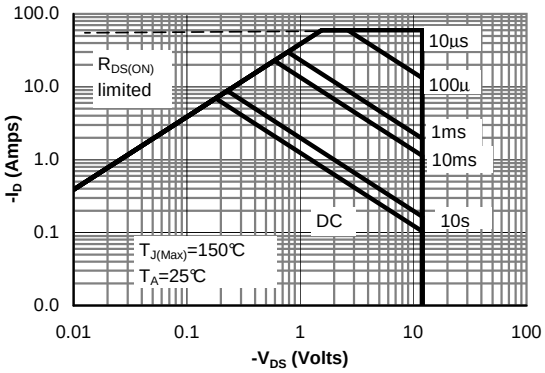


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

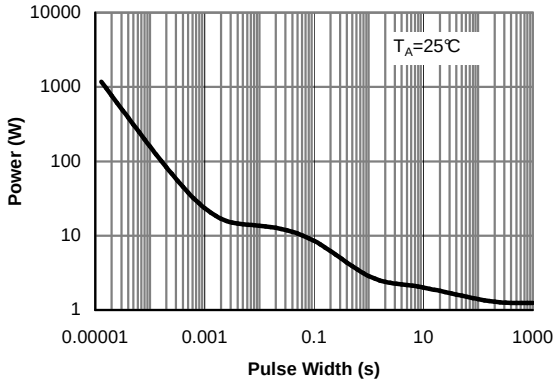


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

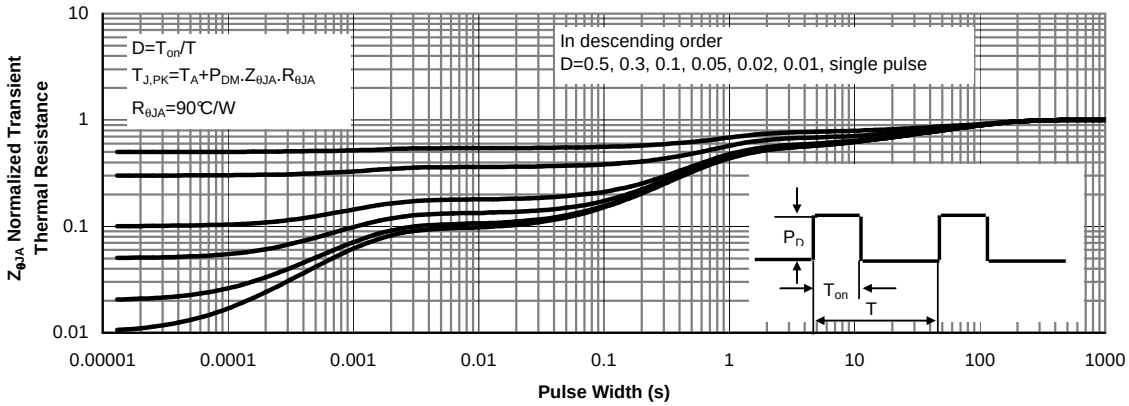
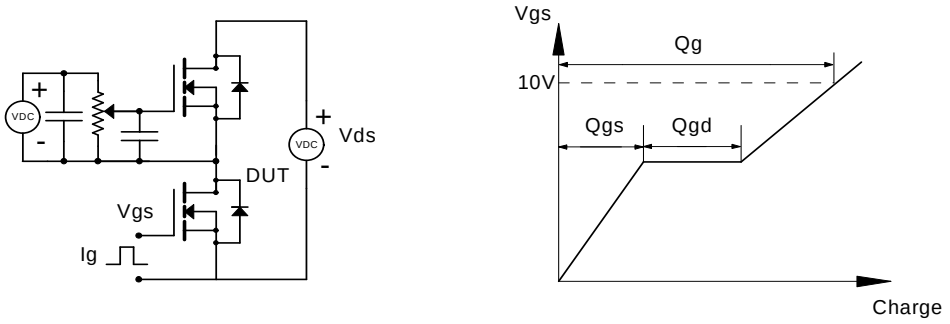
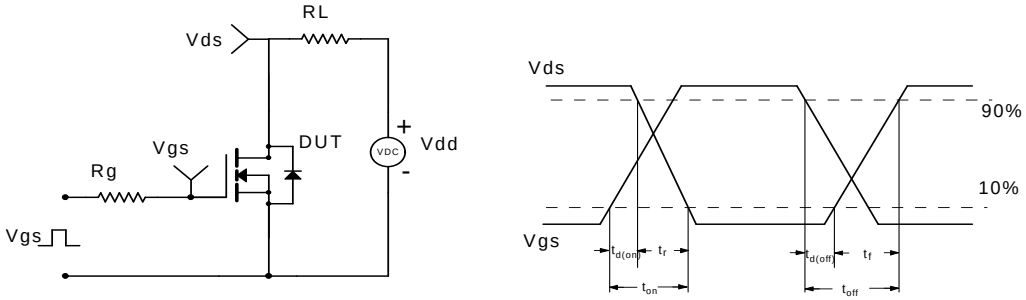


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

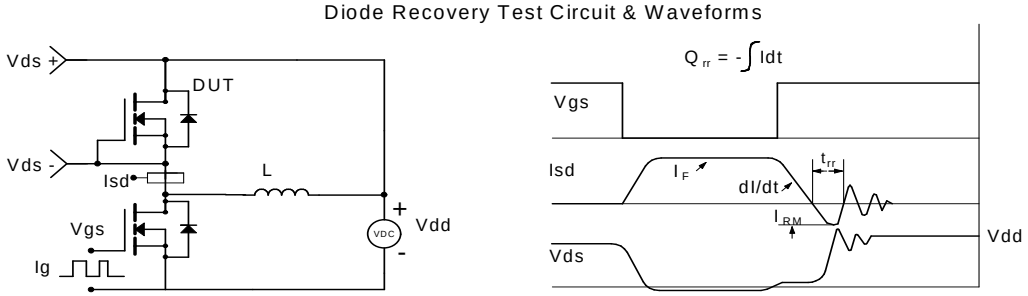
Gate Charge Test Circuit & Waveform



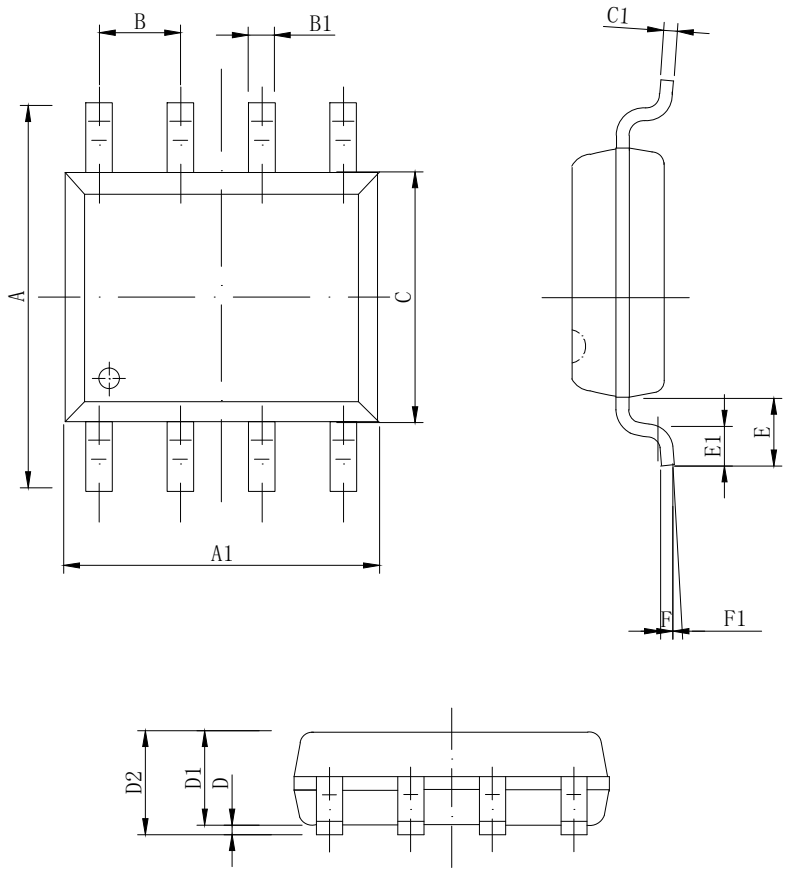
Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



SOP-8 Package information



DIM	MIN	NOM	MAX
A	5.800	6.000	6.200
A1	4.800	4.900	5.000
B		1.270BSC	
B1	0.35 ^ 8x	0.40 ^ 8x	0.45 ^ 8x
C	3.780	3.880	3.980
C1	-	0.203	0.253
D	0.050	0.150	0.250
D1	1.350	1.450	1.550
D2	1.500	1.600	1.700
E		1.060 REF	
E1	0.400	0.700	0.100
F		0.250BSC	
F1	2°	4°	6°

All Dimensions in mm