GROUP SEMICONDUCTOR

GSX6068T

MOSFET

Metal Oxide Semiconductor Field Effect Transistor

Trench MOSFET

60V Normal Power Transistor

GSX6068T

Data Sheet

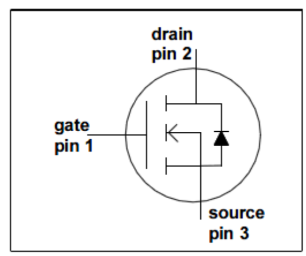
Ver 1.1

2015-3-20

60V 68APower MOSFET

■Description

GroupSemiconductor(GS) has series Trench power MOSFET platforms for voltage up 20V to 200 volts, both with design service and manufacturing capability, including cell, termination design and simulation.
The GS 60V 68A power MOSFET is a Low voltage N channel Trench power MOSFET sample with advanced technology to have better characteristics, such as fast switching time, low Ciss and Crss, low on resistance and excellent avalanche characteristics, making it especially suitable for applications which require superior power density and outstanding efficiency.



■ Features

RDS(ON)=12m Ω @VGS = 10V
VDS = 60V
ID (@ VGS=10V) = 68A

■ PKG

GSS6068T	GSD6068T	GSA6068T	GSP6068T	GSB6068T
TO-251	TO-252	TO-220Fullpak	TO-220	TO-263

■Absolute Maximum Ratings (TC = 25° C, unless otherwise specified)

Symbol	Parameter	Maximum	Units
VDS	Drain-Source Voltage	60	V
VGS	Gate-Source Voltage	±25	V
ID(1)	Continuous Drain Current (TC=25° C)	68	A
	Continuous Drain Current (TC=100° C)	50	
IDM(2)	Pulsed Drain Current	260	A

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EAR(2),(3)	Repetitive avalanche energy	150	mJ
EAS(4)	Single pulsed avalanche energy (1mH)	580	mJ
dv/dt	Peak diode recovery dv/dt	5	V/ns
PD(1)	Power Dissipation (TC=25° C) TO-220	80	W
	Derating above 25° C	1.5	W/ ° C
TJ	Max. operating junction temperature	150	° C
TSTG	Storage temperature	-55 to +150	° C

■Thermal Characteristics

Symbol	Parameter	Value (TO220)	Unit
$R_{\theta JA}$ (6)	Maximum Junction-to-Ambient	82	C/W
$R_{\theta CS}$ (6)	Maximum Case-to-sink	0.6	C/W
$R_{\theta JC}$ (7),(8)	Maximum Junction-to-Case θ	4.1	C/W

1. The power dissipation PD is based on TJ(MAX)=150° C in a TO-251 package, using junction-to-case thermal resistance.
2. Repetitive rating, pulse width limited by junction temperature TJ(MAX)=150° C.
3. L=1mH, Starting TJ=25° C.
4. L = 10mH, starting TJ = 25° C.
5. L=60mH, starting TJ = 25° C.
6. The tests are performed with the device with T A =25° C.
7. The R □ JA is the sum of the thermal impedance from junction to case R □ JC and case to ambient.
8. These curves are based on the junction-to-case thermal impedance, assuming a maximum junction temperature of TJ(MAX)=150° C.

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■ Electrical Characteristics (TJ=25° C unless otherwise specified)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Off Characteristics						
BVDSS	Drain-Source Breakdown Voltage	ID=250uA, VGS=0V, TJ=25° C	60			V
BVDSS /ΔTJ	Zero Gate Voltage Drain Current	ID=250uA, VGS=0V		0.72		V/° C
IDSS	Zero Gate Voltage Drain Current	VDS=60V, VGS=0V			1	uA
		VDS=60V, TJ=125° C	10			
IGSS	Gate-Body leakage current	VDS=0V, VGS=20V			100	nA
		VDS=0V, VGS=-20V	-100			
On Characteristics						
VGS(th)	Gate Threshold Voltage	VDS=Vgs, ID=250uA	1.5		2.5	V
RDS(ON)	Static Drain-Source On-Resistance	VGS=10V, ID=30A		0.01	0.012	Ω
gFS	Forward Transconductance	VDS = 10 V, ID = 20A		20		S
Source Drain Diode Characteristics						
VSD	Diode Forward Voltage	IS=30A,VGS=0V		0.82	1.2	V
ISD	Continuous source-drain Current			80		A
trr	Reverse Recovery Time	IF=60A,dI/dt=100A/us		32		ns
Qrr	Reverse Recovery Charge	IF=60A,dI/dt=100A/us		56		nC
Dynamic Characteristics						
Ciss	Input Capacitance	VGS=0V, VDS=15V, f=1MHz		3690		pF
Coss	Output Capacitance	VGS=0V, VDS=15V, f=1MHz		940		pF
Crss	Reverse Transfer Capacitance	VGS=0V, VDS=15V, f=1MHz		80		pF
Qg	Total Gate Charge	VDS=10V, ID=30A		69		nC
Qgs	Gate Source Charge	VDS=10V, ID=30A		15		nC
Qgd	Gate Drain Charge	VDS=10V, ID=30A		21		nC
Switching Characteristics						
t_d(on)	Turn-On DelayTime	VGS=10V, VDS=10V, ID=30A, RG=2.5 Ω		18		ns
tr	Turn-On Rise Time			12		ns
t_d(off)	Turn-Off DelayTime			56		ns
tf	Turn-Off Fall Time			14		ns

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

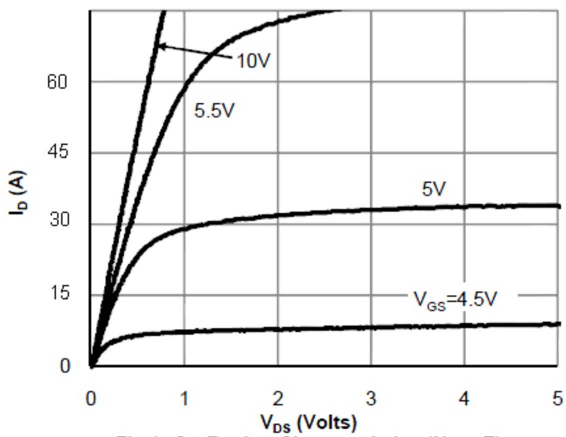

Fig 1: On-Region Characteristics (Note E)

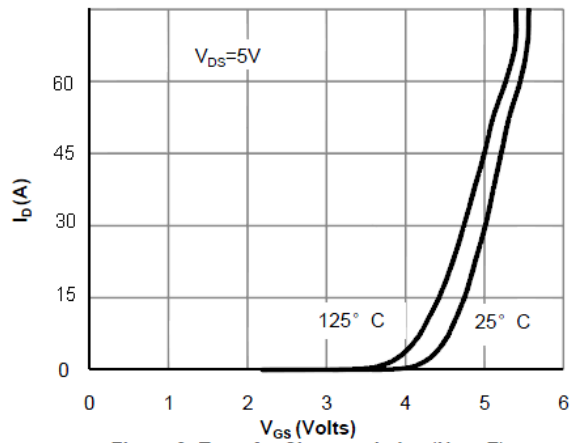

Figure 2: Transfer Characteristics (Note E)

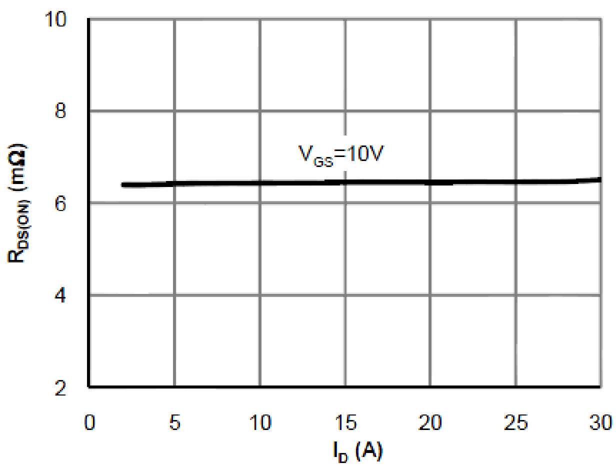

Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

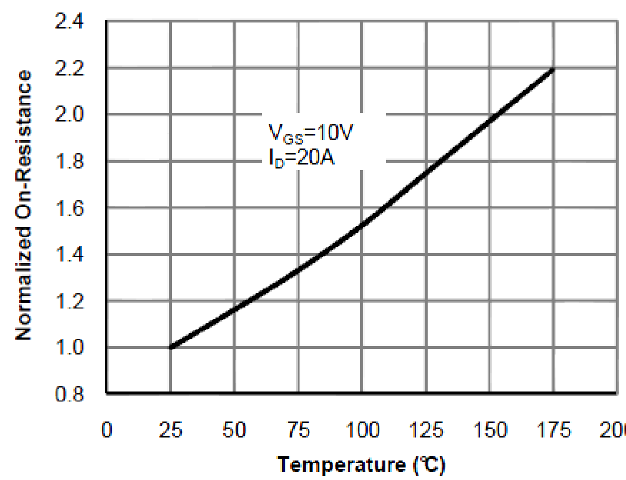

Figure 4: On-Resistance vs. Junction Temperature (Note E)

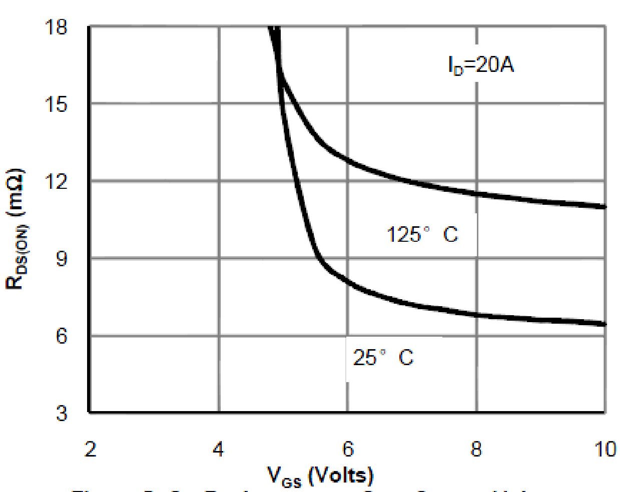

Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

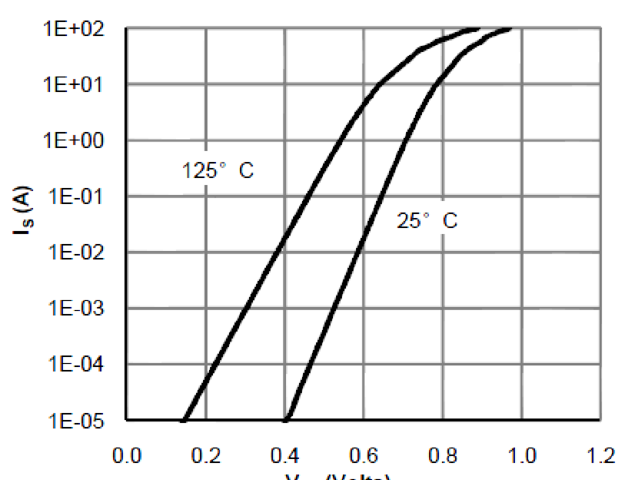

Figure 6: Body-Diode Characteristics (Note E)

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

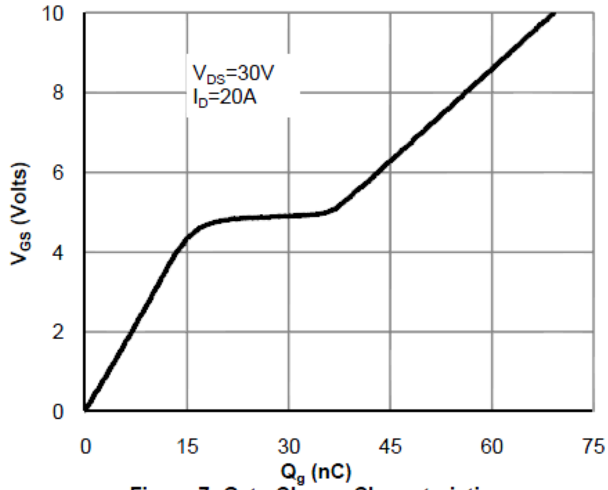

Figure 7: Gate-Charge Characteristics

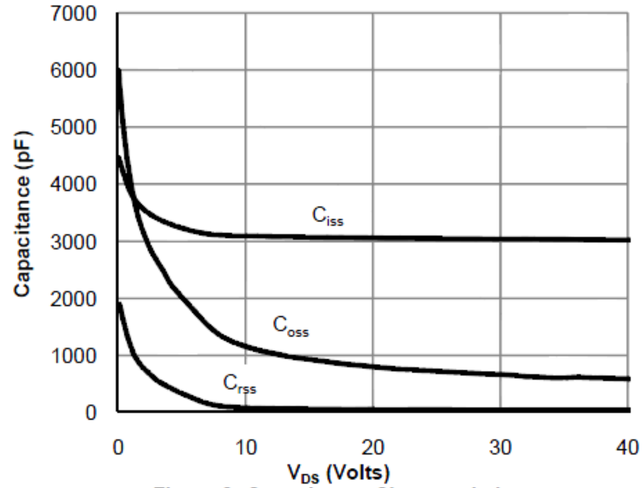

Figure 8: Capacitance Characteristics

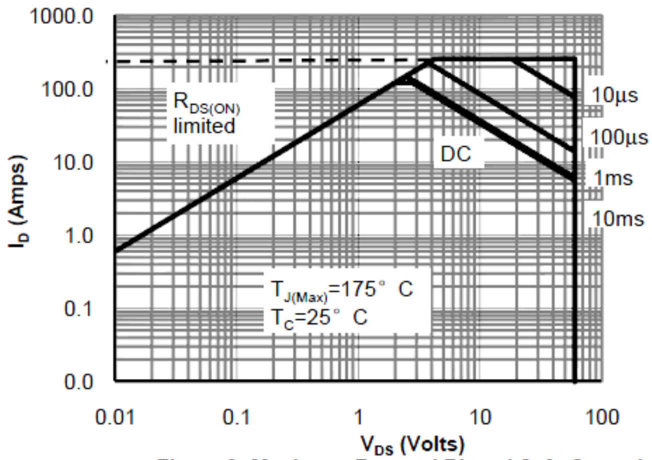

Figure 9: Maximum Forward Biased Safe Operatin Area (Note F)

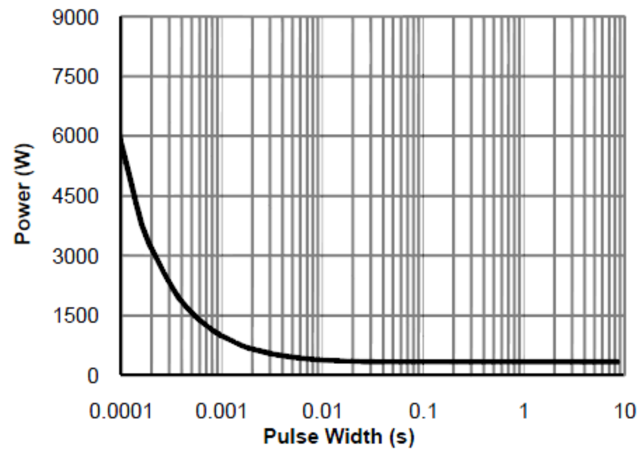

Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

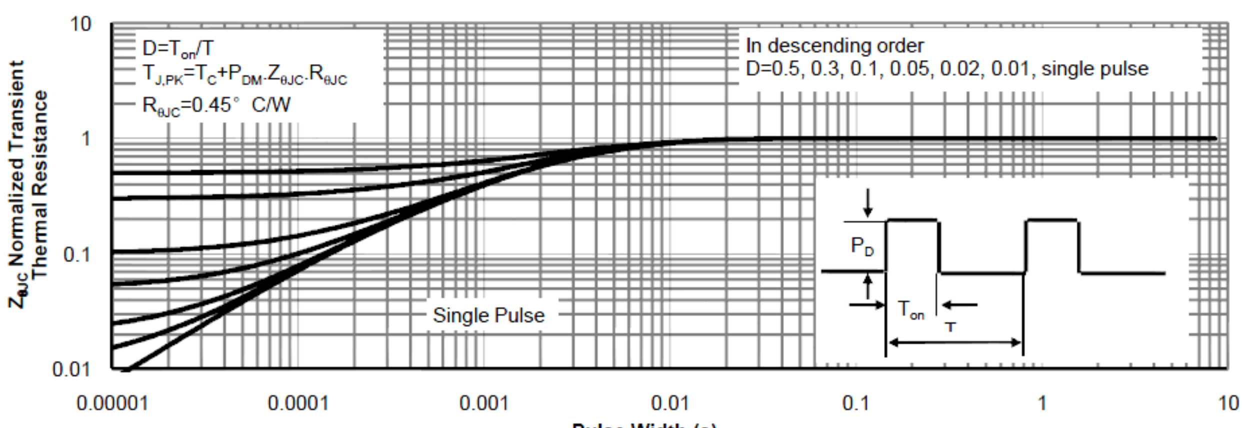

Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

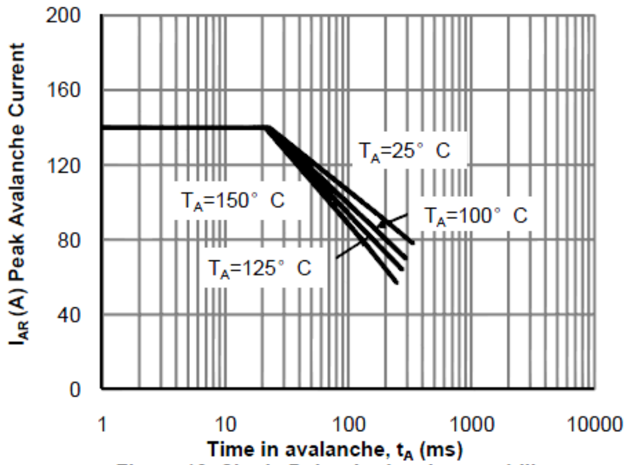

Figure 12: Single Pulse Avalanche capability (Note C)

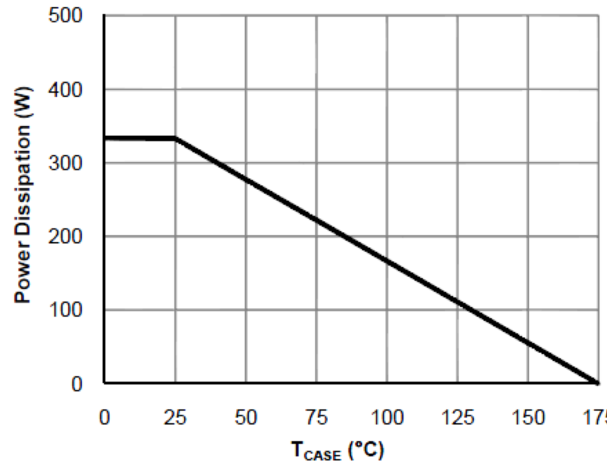

Figure 13: Power De-rating (Note F)

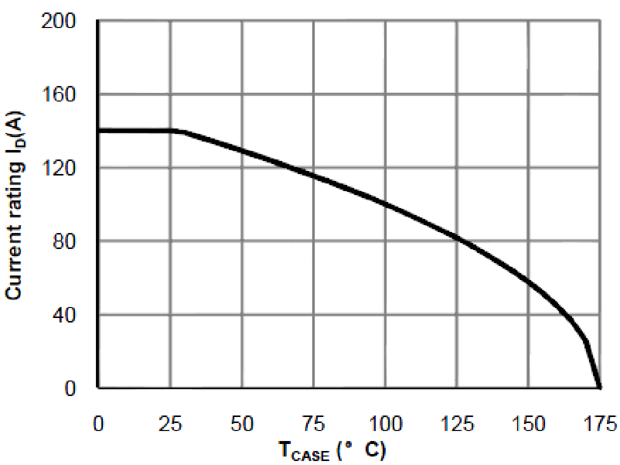

Figure 14: Current De-rating (Note F)

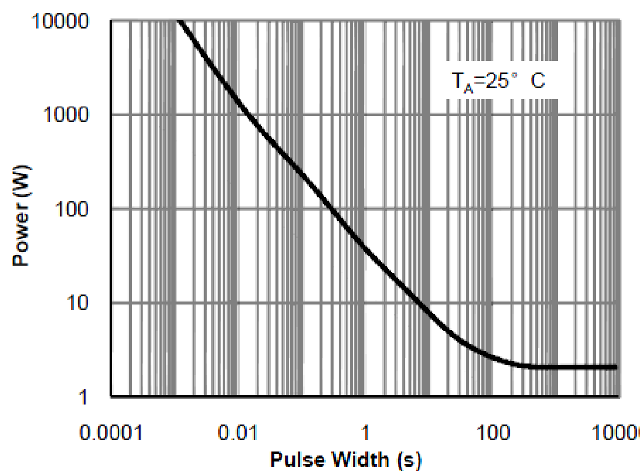

Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

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Table 20 Switching times test circuit and waveform for inductive load

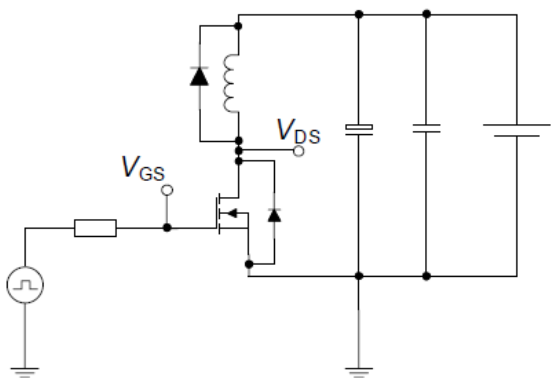
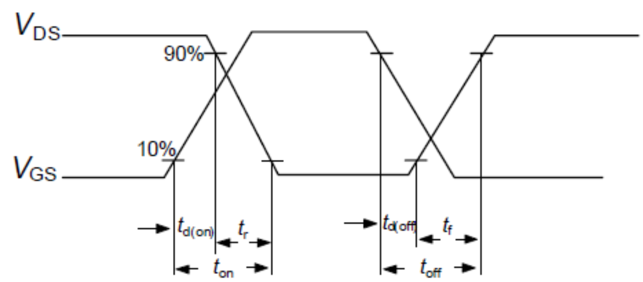
Switching times test circuit for inductive load	Switching time waveform
	

Table 21 Unclamped inductive load test circuit and waveform

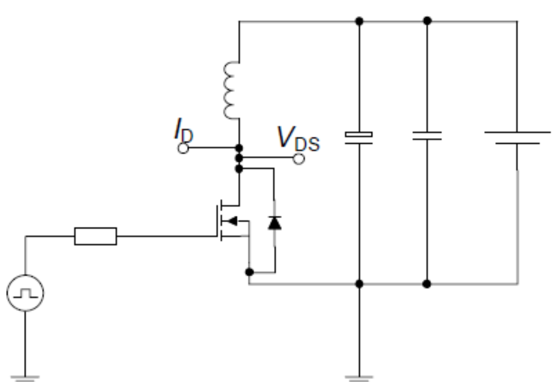
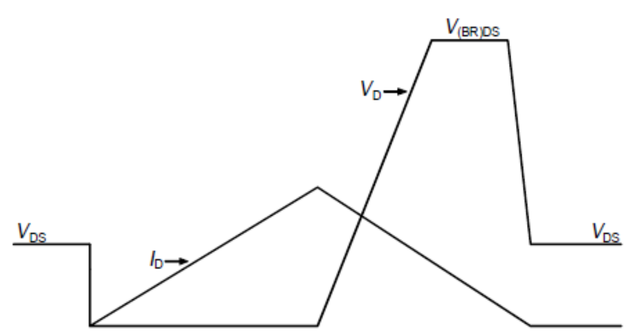
Unclamped inductive load test circuit	Unclamped inductive waveform
	

Table 22 Test circuit and waveform for diode characteristics

Test circuit for diode characteristics	Diode recovery waveform