SLW60R070SJ

600V N-Channel MOSFET

General Description

This Power MOSFET is produced using Maple semi's Advanced Super-Junction technology.

This advanced technology has been especially tailored to minimize conduction loss, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

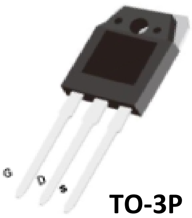
These devices are well suited for AC/DC power conversion

Features

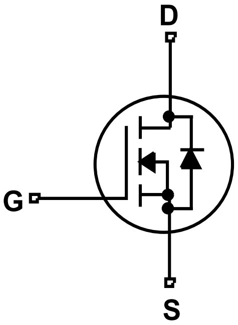
-47A, 600V, RDS(on) typ.= 60mΩ@VGS = 10 V

- Low gate charge (typical 170nC)
- High ruggedness
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

TO-247



TO-3P



Absolute Maximum Ratings

TC = 25°C unless otherwise noted

Symbol	Parameter	SLW60R070SJ	Units
VDSS	Drain-Source Voltage	600	V
ID	Drain Current - Continuous (TC = 25℃)	47	A
	- Continuous (TC = 100℃)	29	A
IDM	Drain Current - Pulsed (Note 1)	140	A
VGSS	Gate-Source Voltage	±30	V
EAS	Single Pulsed Avalanche Energy (Note 2)	1135	mJ
IAR	Avalanche Current (Note 1)	9.3	A
EAR	Repetitive Avalanche Energ (Note 1)	1.72	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	50	V/ns
PD	Power Dissipation (TC = 25℃)	391	W
	- Derate above 25℃	3.13	W/℃
TJ, TSTG	Operating and Storage Temperature Range	-55 to +150	℃
TL	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	℃

*Drain current limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	Value	Units
RθJC	Thermal Resistance, Junction-to-Case	0.32	℃/W
RθJS	Thermal Resistance, Case-to-Sink Typ.	0.5	℃/W
RθJA	Thermal Resistance, Junction-to-Ambient	62	℃/W

Electrical Characteristics (TC = 25 °C unless otherwise noted)

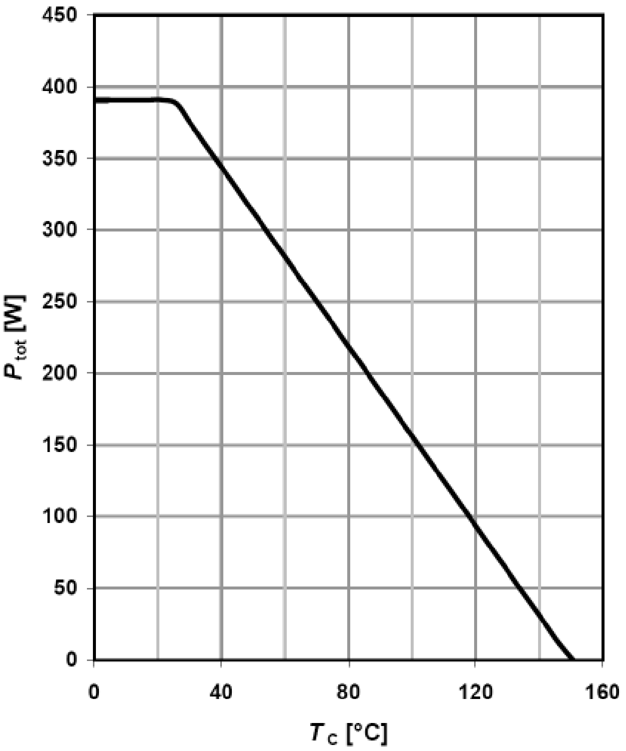
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BVDSS	Drain-Source Breakdown Voltage	VGS = 0V,ID = 250uA, TJ=25℃	600	-	-	V
		VGS = 0V,ID = 250uA, TJ=150℃	-	650	-	V
ΔBVDSS ΔTJ	Breakdown Voltage Temperature coefficient	ID = 250uA, referenced to 25°C	-	0.6	-	V/°C
IDSS	Drain-Source Leakage Current	VDS =600V, VGS = 0V	-	-	1	uA
		VDS =480V, TC = 125 °C	-	10	-	uA
IGSS	Gate-Source Leakage, Forward	VGS = 30V, VDS = 0V	-	-	100	nA
	Gate-source Leakage, Reverse	VGS = -30V, VDS = 0V	-	-	-100	nA
On Characteristics						
VGS(th)	Gate Threshold Voltage	VDS = VGS, ID = 250uA	2.5	3.5	4.5	V
RDS(ON)	Static Drain-Source On-state Resistance	VGS =10 V, ID = 23.5A	-	60	70	mΩ
Dynamic Characteristics						
Ciss	Input Capacitance	VGS =0 V, VDS =25V, f = 1MHz	-	3100	-	pF
Coss	Output Capacitance		-	750	-	
Crss	Reverse Transfer Capacitance		-	10	-	
Dynamic Characteristics						
td(on)	Turn-on Delay Time	VDD =480V, ID =23.5A, RG =20Ω	`	16	-	nS
tr	Rise Time		-	12	-	
td(off)	Turn-off Delay Time		-	83	-	
tf	Fall Time		-	5	-	
Qg	Total Gate Charge	VDS =480V, VGS =10V, ID =23.5A	-	170	-	nC
Qgs	Gate-Source Charge		-	21	-	
Qgd	Gate-Drain Charge(Miller Charge)		-	87	-	

Source-Drain Diode Ratings and Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit.
IS	Maximum Continuous Drain-Source Diode Forward Current		-	-	47	A
ISM	Maximum Pulsed Drain-Source Diode Forward Current		-	-	140	
VSD	Diode Forward Voltage	IS =23.5A, VGS =0V	-	-	1.5	V
trr	Reverse Recovery Time	IS =23.5A, VGS=0V, dIF/dt=100A/us	-	720	-	nS
Qrr	Reverse Recovery Charge		-	19	-	uC

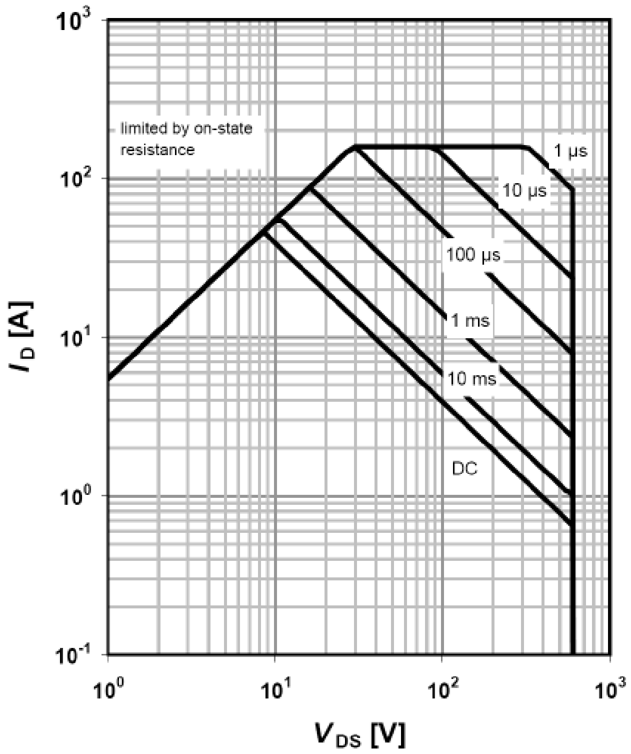
NOTES

1. Repeativity rating : pulse width limited by junction temperature
2. L =25mH, IAS =9.3A, VDD = 50V, RG = 25Ω, Starting TJ = 25°C
3. ISD ≤ ID, di/dt ≤ 200A/us, VDD ≤ BVDSS, Starting TJ = 25°C
4. Pulse Test : Pulse Width ≤ 300us, Duty Cycle ≤ 2%
5. Essentially independent of operating temperature.



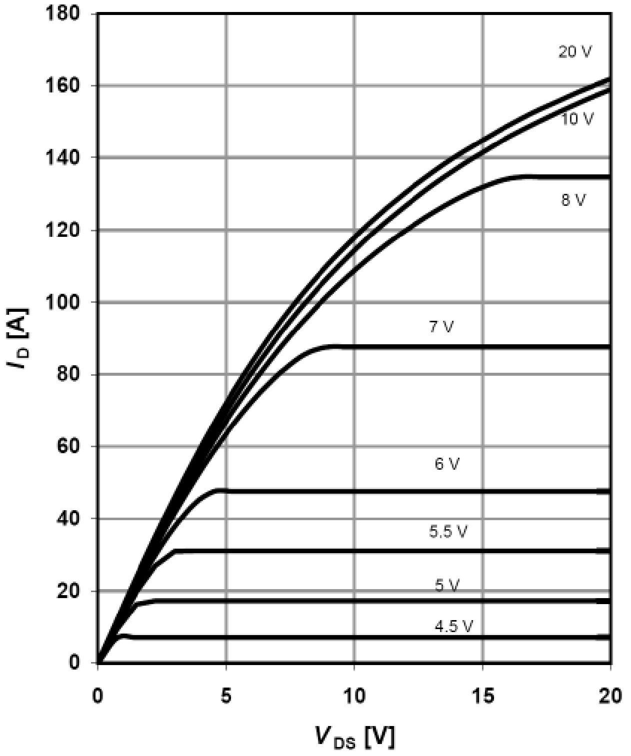
Ptot=f(Tc)

Figure1：Power dissipation



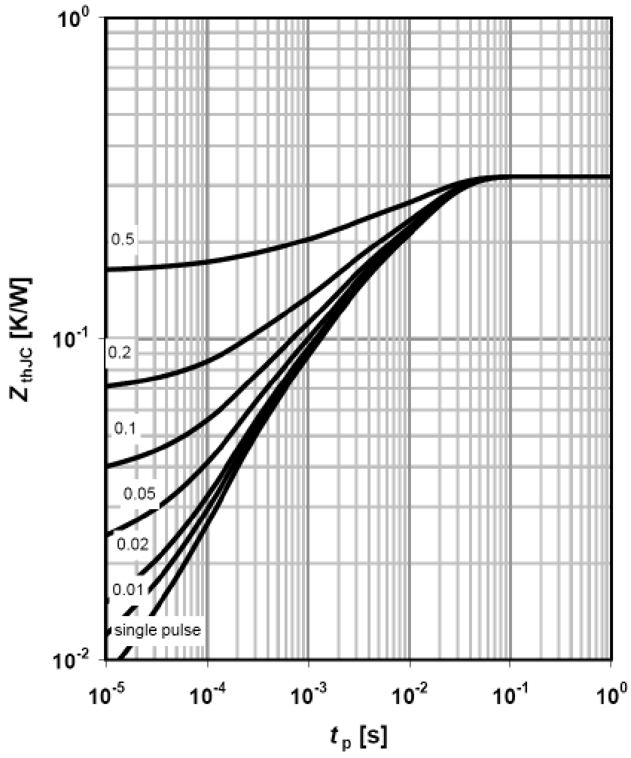
Id=f(Vds);Tc=25℃；D=0;parameter tp

Figure2：Safe operating area T_j=25 ℃



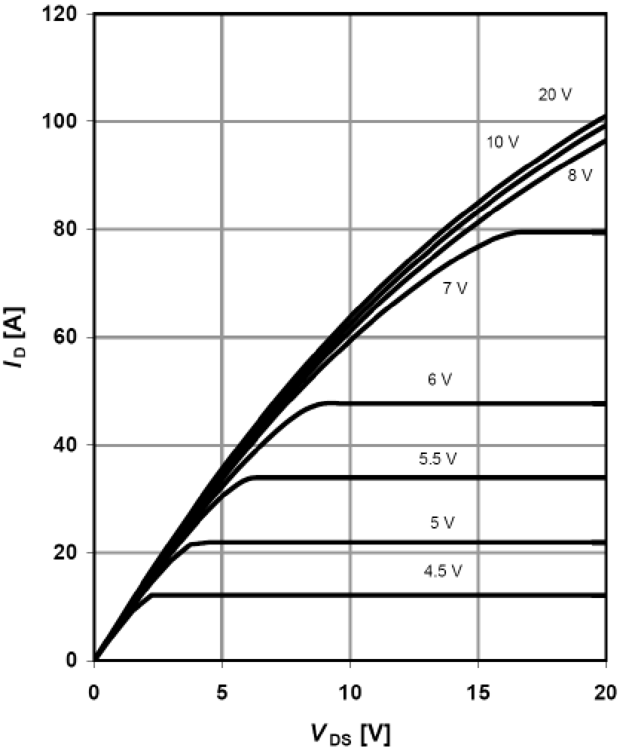
Z(thJC)=f(tp);parameter D=tp/T

Figure3：Max. transient thermal impedance



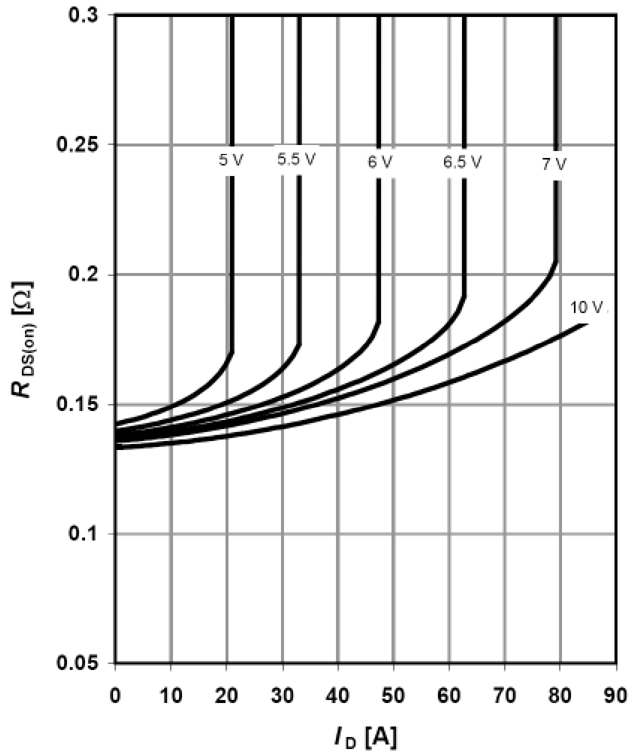
ID=f(VDS); Tj=25 ℃ ; parameter: VG

Figure4：Typ. output characteristics Tj=25 ℃



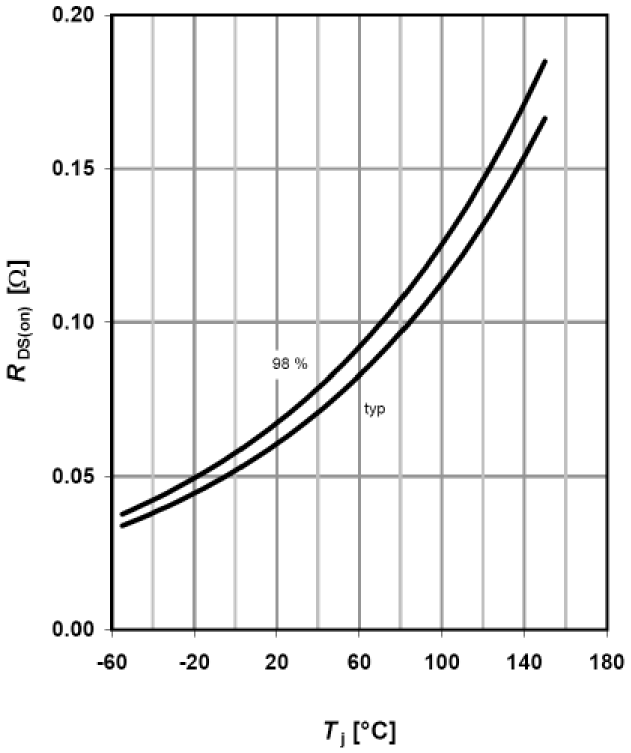
ID=f(VDS); Tj=125 ℃ ; parameter: VGS

Figure5：Typ. output characteristics T_j=25 ℃



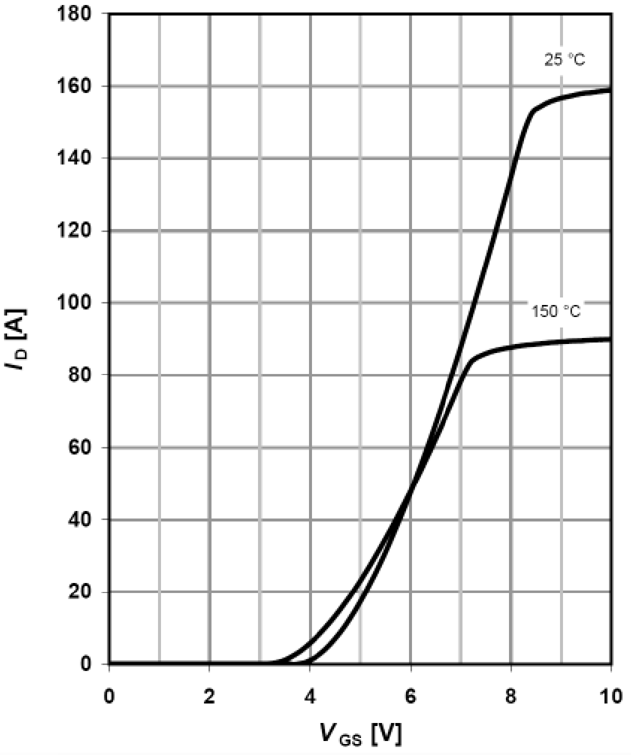
RDS(on)=f(ID); Tj=125 ℃ ; parameter:VGS

Figure6：Typ. drain-source on-state resistance



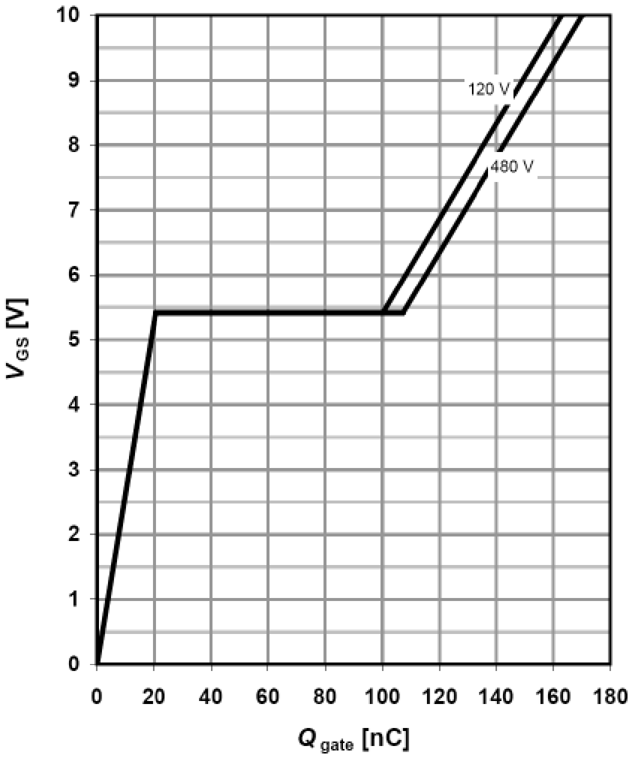
RDS(on)=f(Tj); ID=23 A; VGS=10 V

Figure7：Typ. drain-source on-state resistance



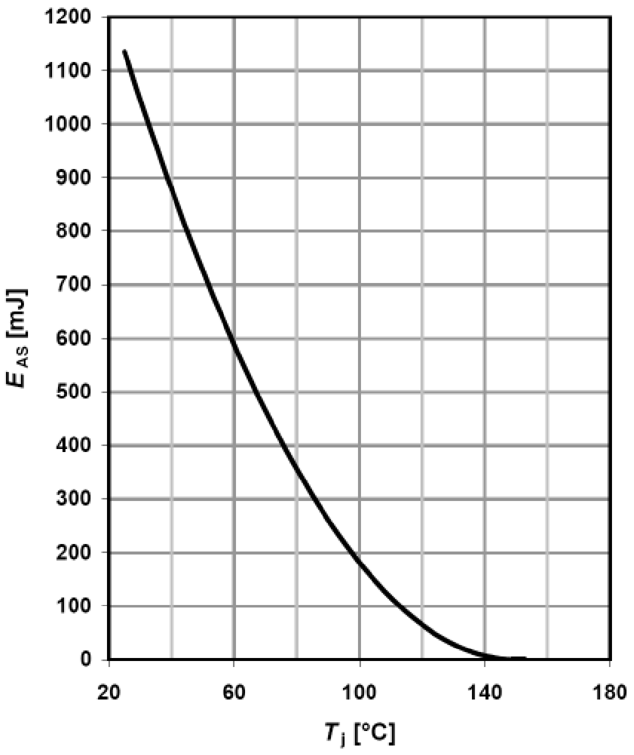
ID=f(VGS); VDS=40V

Figure8：Typ. transfer characteristics



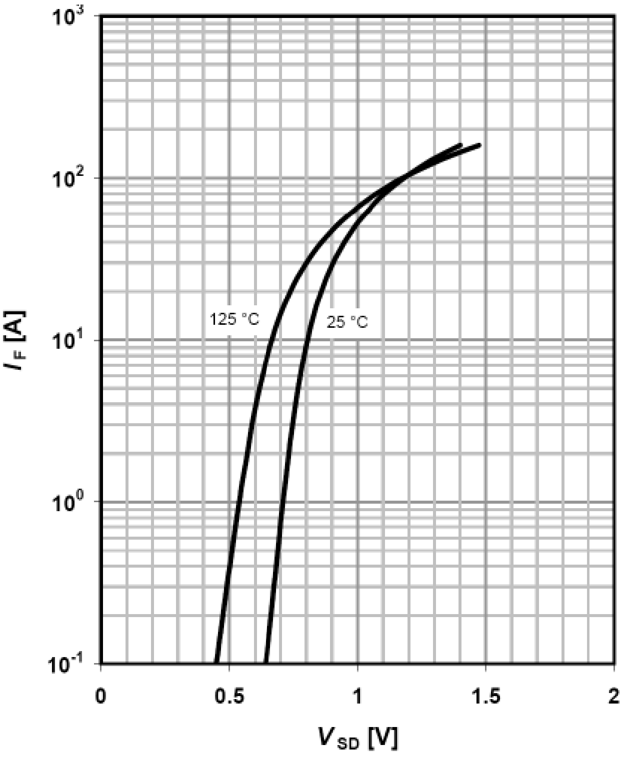
VGS=f(Qg), ID=23A pulsed

Figure9：Typ. gate charge



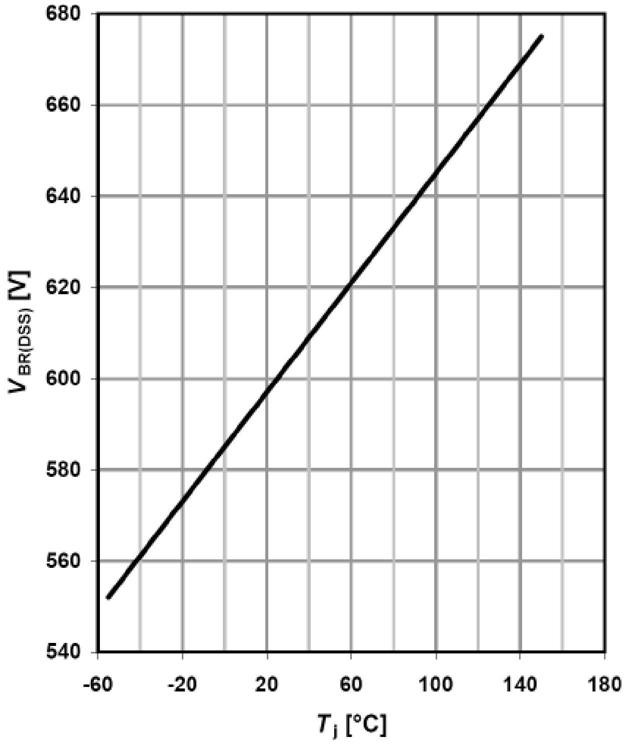
EAS=f(Tj); ID=9.3A; VDD=50 V

Figure10：Avalanche energ



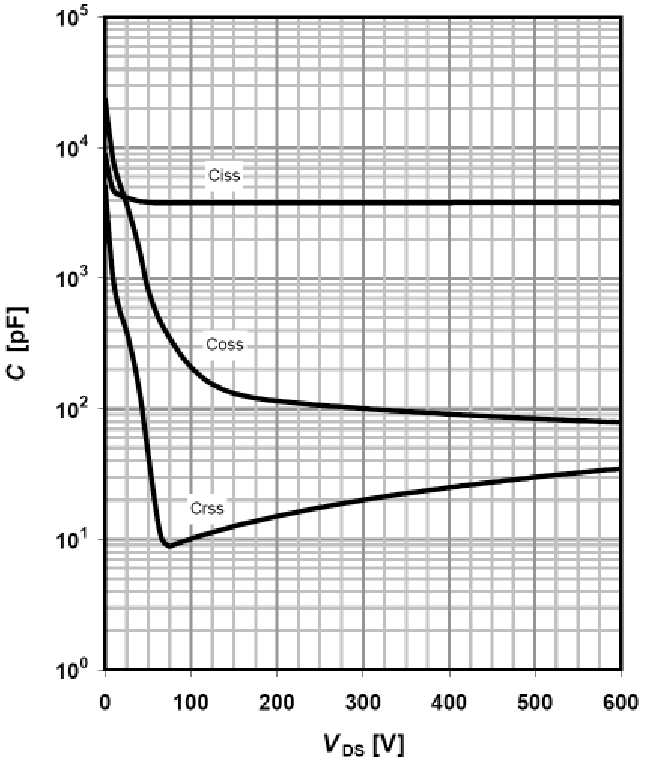
IF=f(VSD); parameter: Tj

Figure11：Forward characteristics of reverse diode



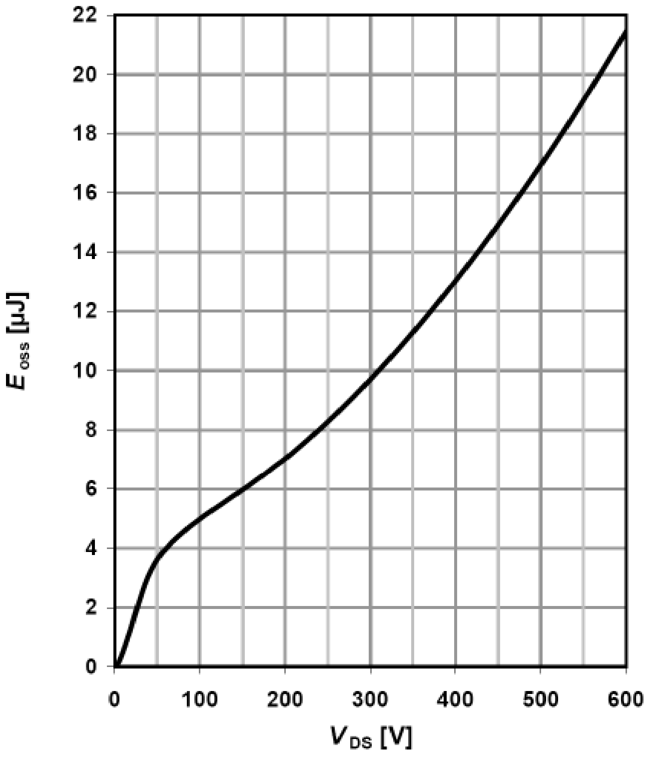
VBR(DSS)=f(Tj); ID=0.25mA

Figure12：Drain-source breakdown voltage



C=f(VDS); VGS=0 V; f=1 MHz

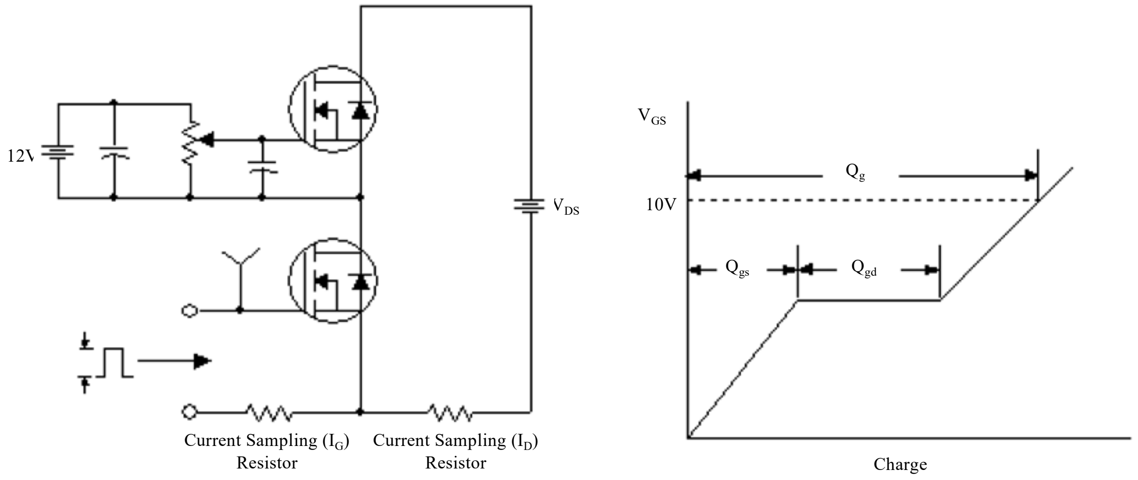
Figure13：Typ. capacitances



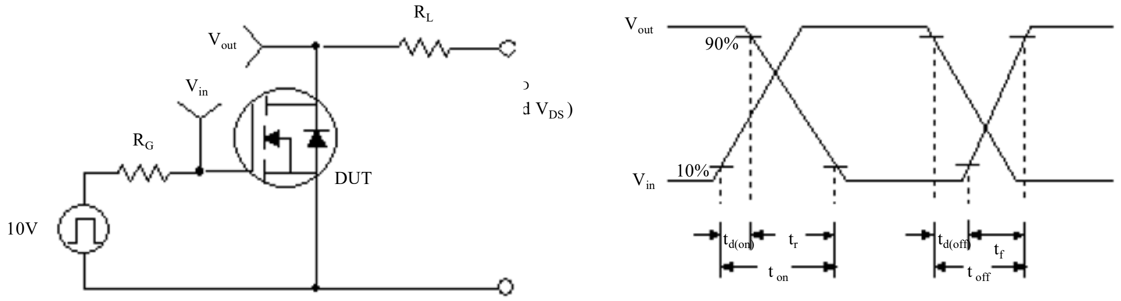
EOSS=f(VDS)

Figure14：Typ. Coss stored energy

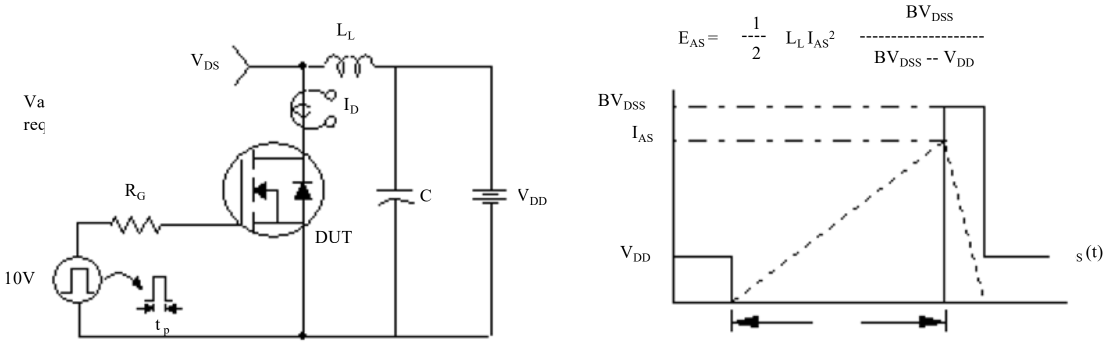
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms