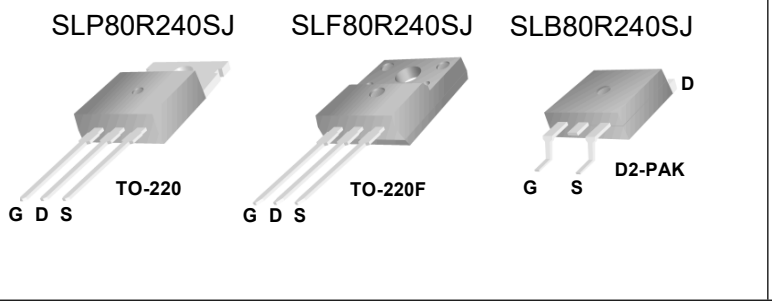
SLB/F/P80R240SJ
800V N-Channel MOSFET

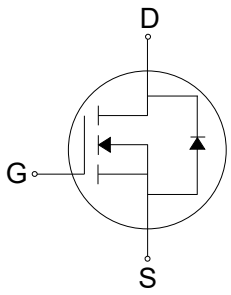
General Description

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

- 20A, 800V, RDS(on) typ.= 0.22Ω@VGS = 10 V
- Low gate charge (typical 70nC)
- High ruggedness
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability





Absolute Maximum Ratings

TC = 25°C unless otherwise noted

Symbol	Parameter		D2PAK/TO-220	TO-220F	Units
VDSS	Drain-Source Voltage		800		V
ID	Drain Current	- Continuous (TC = 25℃)	20	20*	A
		- Continuous (TC = 100℃)	10	10*	A
IDM	Drain Current - Pulsed	(Note 1)	62	62*	A
VGSS	Gate-Source Voltage		±30		V
EAS	Single Pulsed Avalanche Energy	(Note 2)	485		mJ
IAR	Avalanche Current	(Note 1)	20		A
EAR	Repetitive Avalanche Energ	(Note 1)	1		mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	4.5		V/ns
PD	Power Dissipation (TC = 25℃)		205	35	W
		- Derate above 25℃	1.7	0.3	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
		TO-220	D2PAK	TO-220F	
RθJC	Thermal Resistance, Junction-to-Case	0.6	0.6	3.6	℃/W
RθJS	Thermal Resistance, Case-to-Sink Typ.	0.5	0.5	-	℃/W
RθJA	Thermal Resistance, Junction-to-Ambient	62	62	80	℃/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℃	800	-	-	V
		VGS = 0V,ID = 250uA, TJ=150℃	-	850	-	V
ΔBVDSS ΔTJ	Breakdown Voltage Temperature coefficient	ID = 250uA, referenced to 25°C	-	0.6	-	V/°C
IDSS	Drain-Source Leakage Current	VDS =800V, VGS = 0V	-	-	1	uA
		VDS =640V, 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 = 10A	-	0.22	0.24	Ω
Dynamic Characteristics						
Ciss	Input Capacitance	VGS =0 V, VDS =25V, f = 1MHz	-	1440	-	pF
Coss	Output Capacitance		-	300	-	
Crss	Reverse Transfer Capacitance		-	10	-	
Dynamic Characteristics						
td(on)	Turn-on Delay Time	VDD =400V, ID =10A, RG =20Ω	`	25	-	nS
tr	Rise Time		-	55	-	
td(off)	Turn-off Delay Time		-	70	-	
tf	Fall Time		-	40	-	
Qg	Total Gate Charge	VDS =480V, VGS =10V, ID =10A	-	70	-	nC
Qgs	Gate-Source Charge		-	7.8	-	
Qgd	Gate-Drain Charge(Miller Charge)		-	9	-	

Source-Drain Diode Ratings and Characteristics

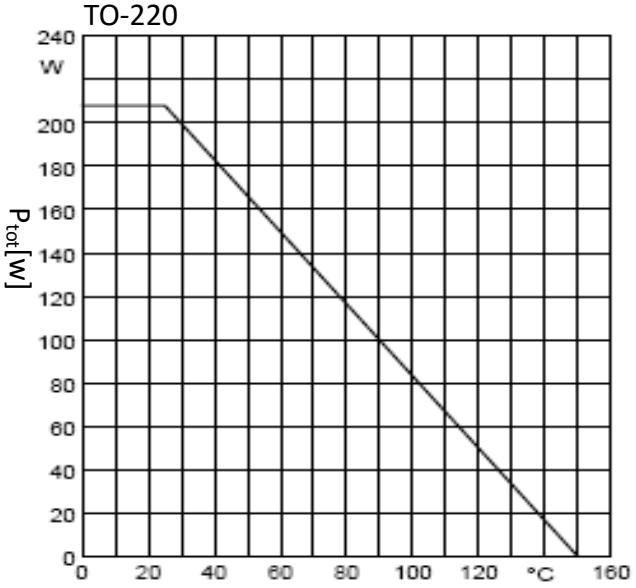
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit.
IS	Maximum Continuous Drain-Source Diode Forward Current		-	-	20	A
ISM	Maximum Pulsed Drain-Source Diode Forward Current		-	-	60	
VSD	Diode Forward Voltage	IS =10A, VGS =0V	-	1	1.5	V
trr	Reverse Recovery Time	IS =10A, VGS=0V, dIF/dt=100A/us	-	475	-	nS
Qrr	Reverse Recovery Charge		-	5.8	-	uC

NOTES

1. Repeativity rating : pulse width limited by junction temperature
2. L =79mH, IAS =3.5A, 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.

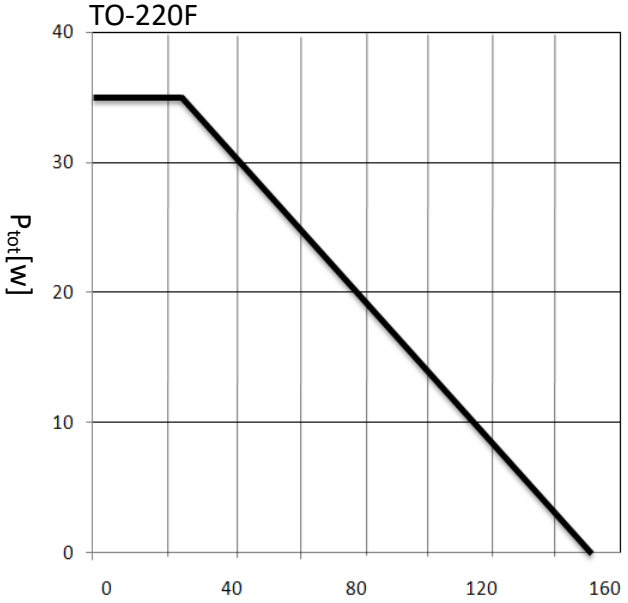
Typical Performance Characteristics

Power dissipation
TO-220



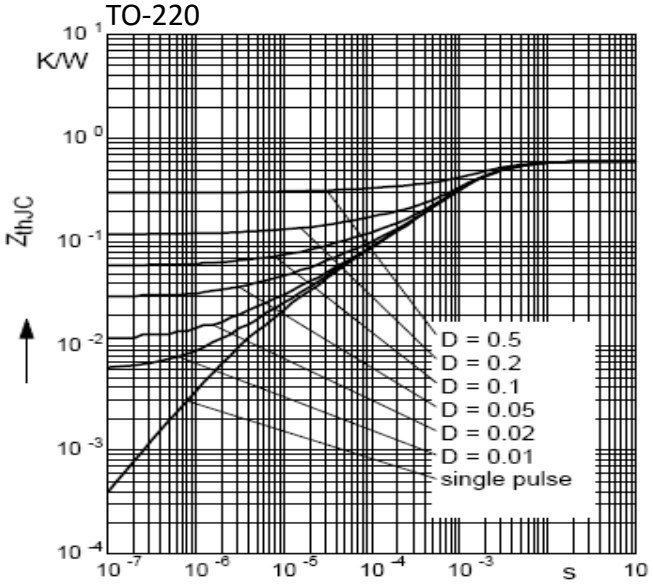
Tc[℃]

Power dissipation
TO-220F



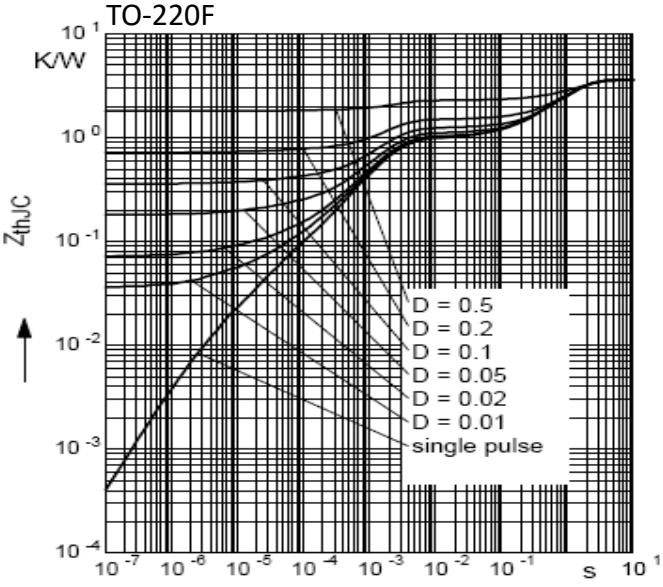
Tc[℃]

Max. transient thermal impedance
TO-220



T_p[s]

Max. transient thermal impedance
TO-220F

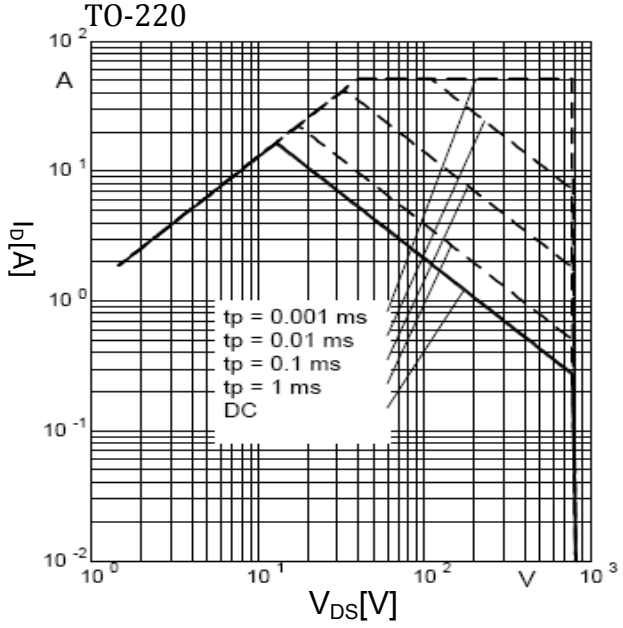


T_p[s]

Typical Performance Characteristics

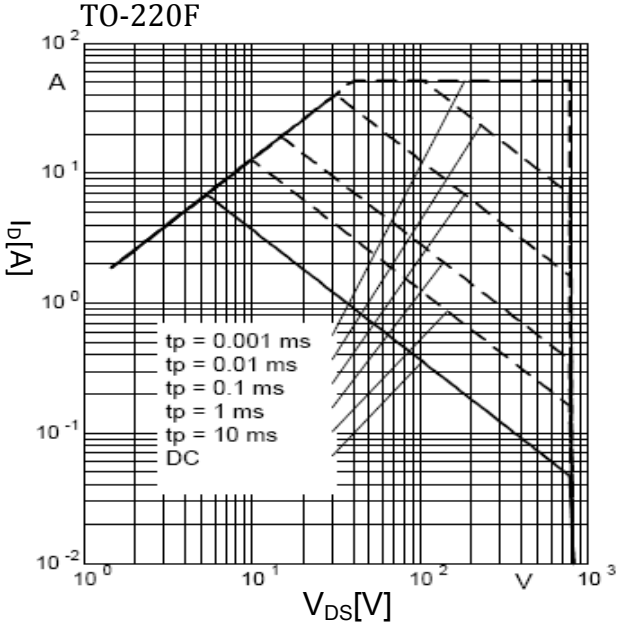
Safe operating area *TC=25 ℃*

TO-220



Safe operating area *TC=25 ℃*

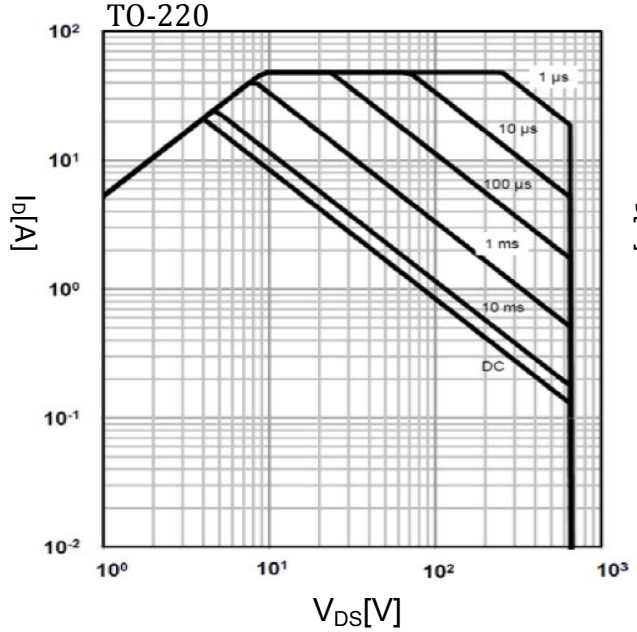
TO-220F



I_D=f(V_{DS}); T_C=25 ℃; V_{GS} > 7V; D=0; parameter t_p

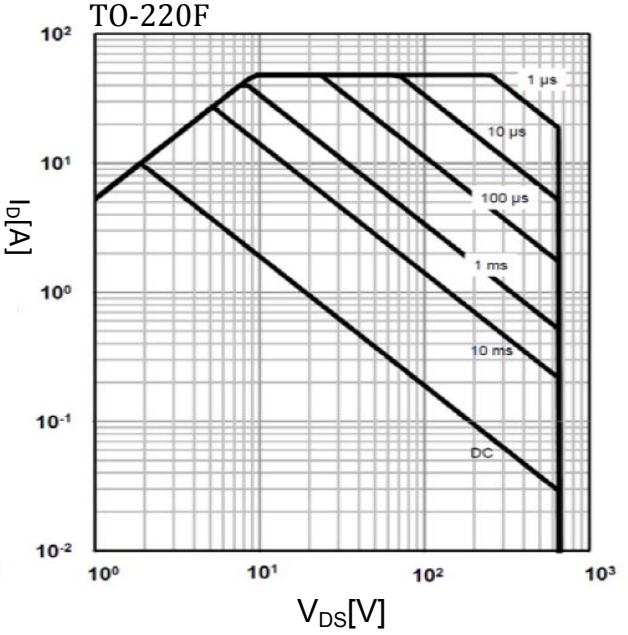
Safe operating area TC=80 ℃

TO-220



Safe operating area TC=80 ℃

TO-220F



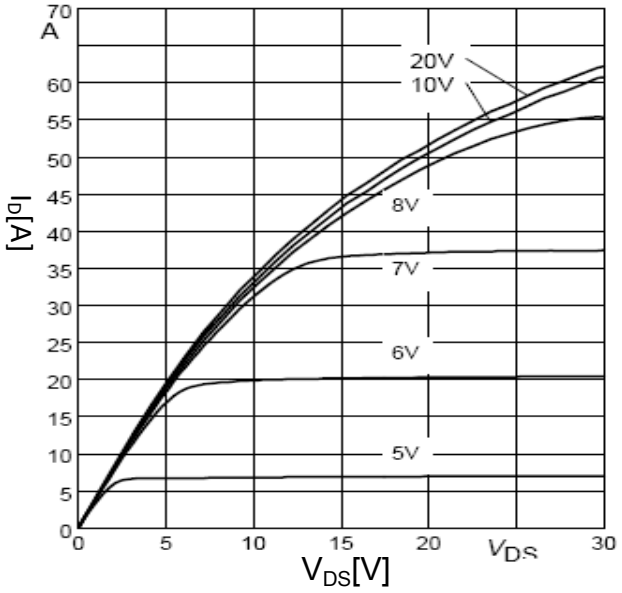
*I*D=f(VDS); TC=80 ℃; VGS > 7V; D=0;

parameter t_p

Typical Performance Characteristics

Typ. output characteristics

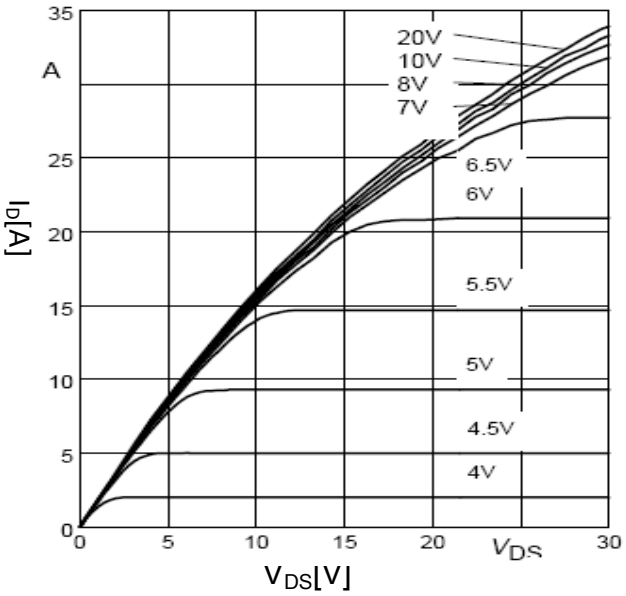
T_j=25 ℃



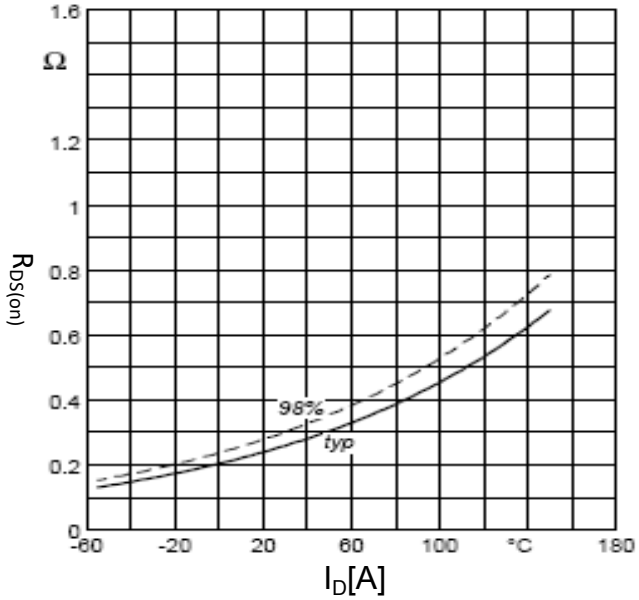
$I_D=f(V_{DS})$; T_j=25 ℃ ; parameter: V_{GS}

Typ. output characteristics

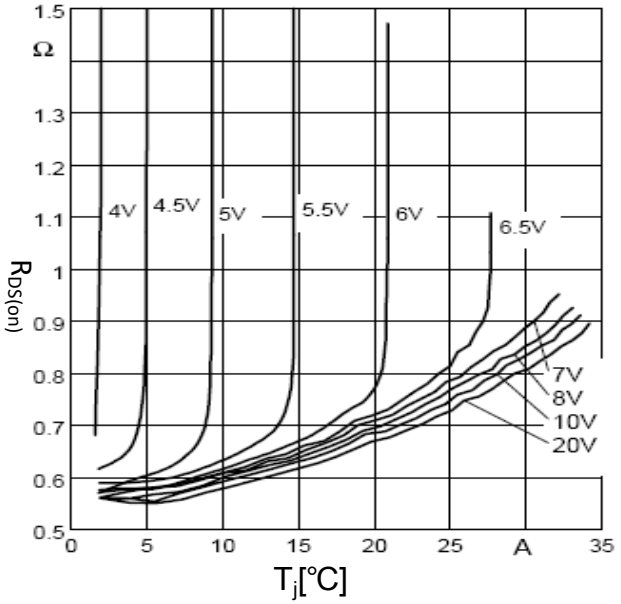
T_j=150 ℃



Typ. drain-source on-state resistance



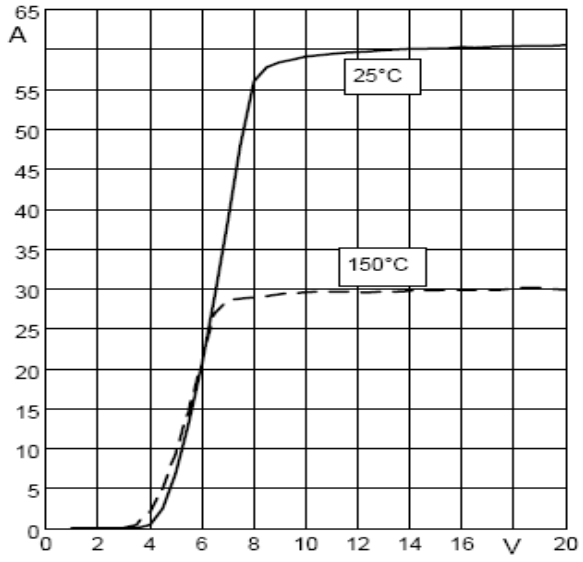
$R_{DS}(on)=f(I_D)$; T_j=150 ℃ ; parameter:V_{GS}



R_{DS}(on)=f(T_j); I_D=11 A; V_{GS}=10 V

Typical Performance Characteristics

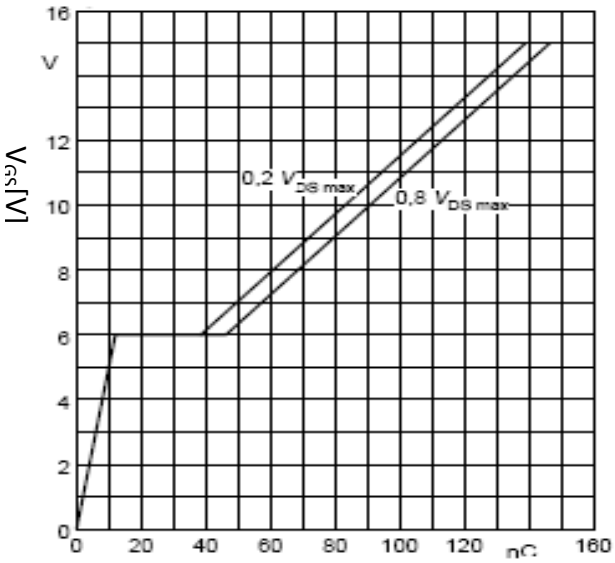
Typ. transfer characteristics



V_{GS}[V]

I_D=f(V_{GS}); V_{DS}=20V

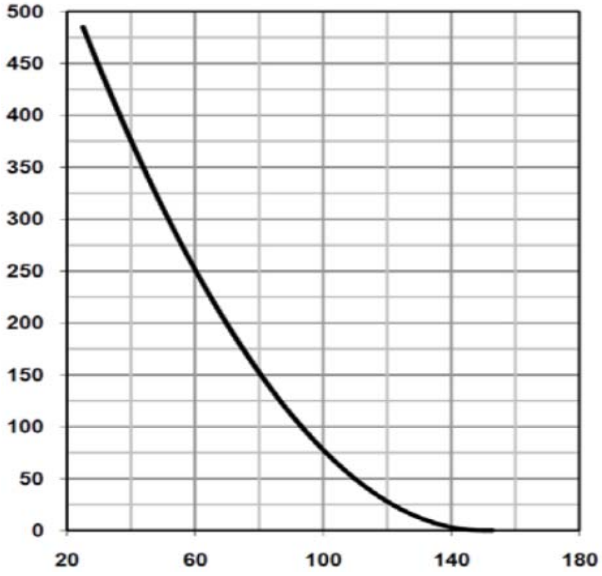
Typ. gate charge



QV_G[nC]

V_{GS}=f(Q_g), I_D=11 A pulsed

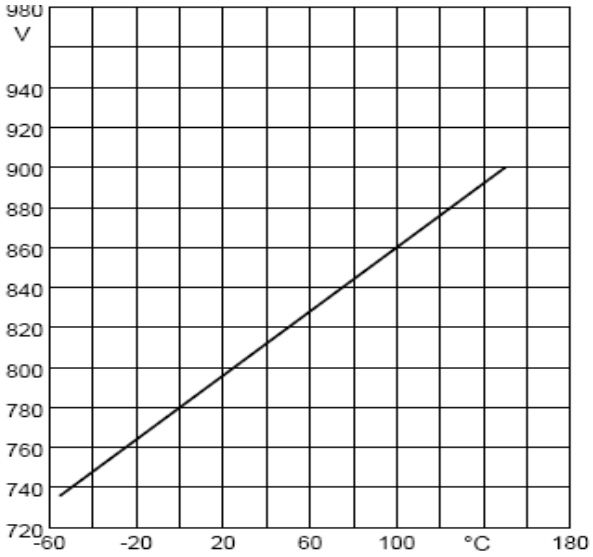
Avalanche energy



T_j[℃]

E_{AS}=f(T_j); I_D=3.5 A; V_{DD}=50 V

Drain-source breakdown voltage

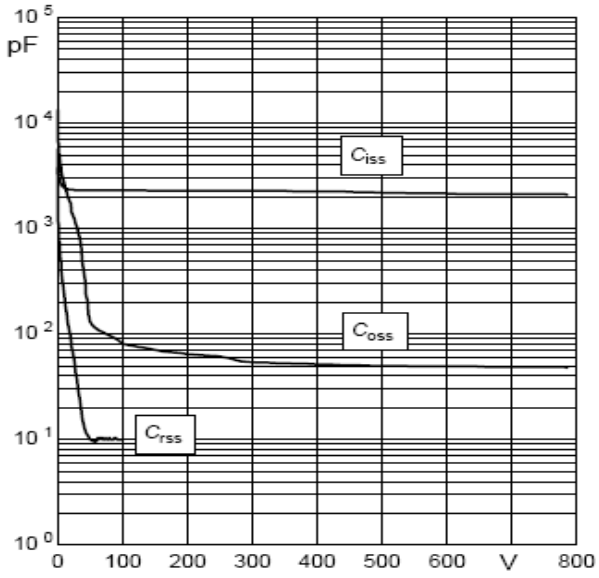


T_j[℃]

$V_{BR(DSS)}$=f(T_j); I_D=1.0 mA

Typical Performance Characteristics

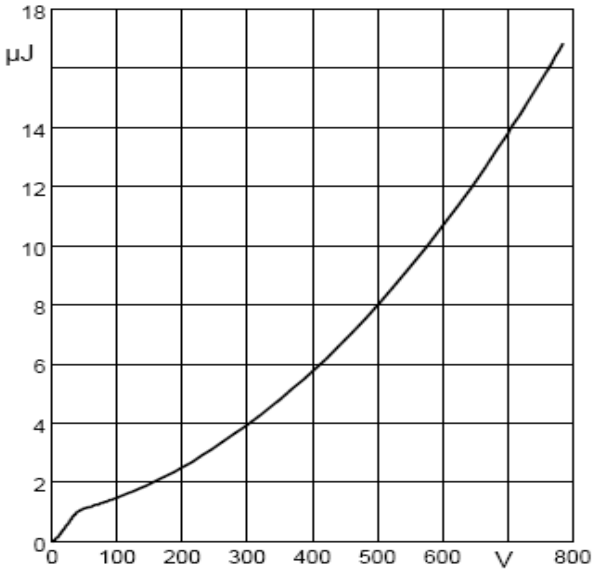
Typ. capacitances



V_{DS}[V]

C=f(V_{DS}); V_{GS}=0 V; f=1 MHz

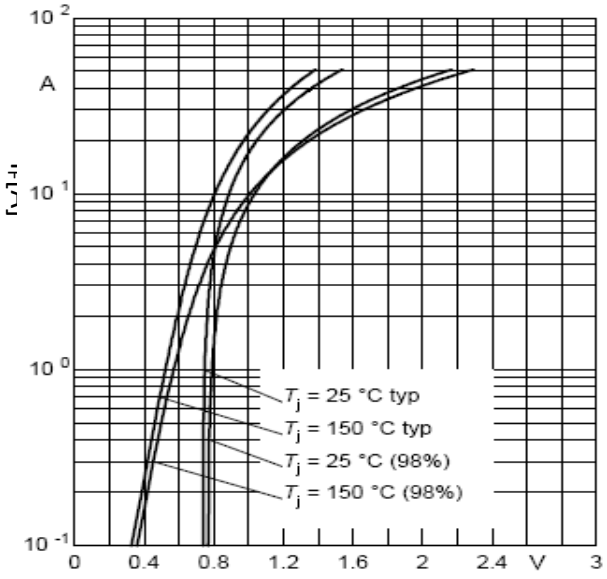
Typ. *Coss stored energy*



V_{DS}[V]

E_{OSS}=f(V_{DS})

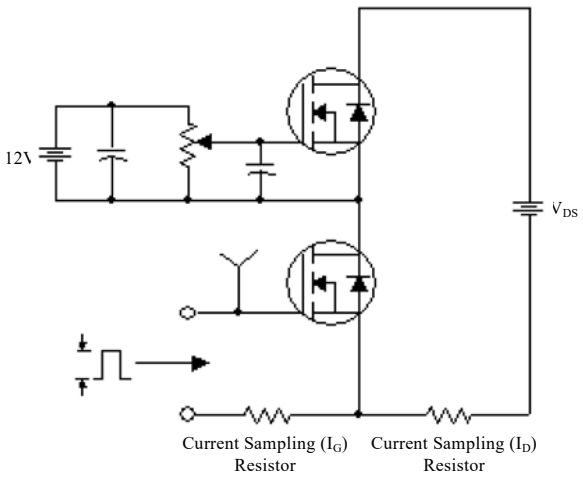
Forward characteristics of reverse diode

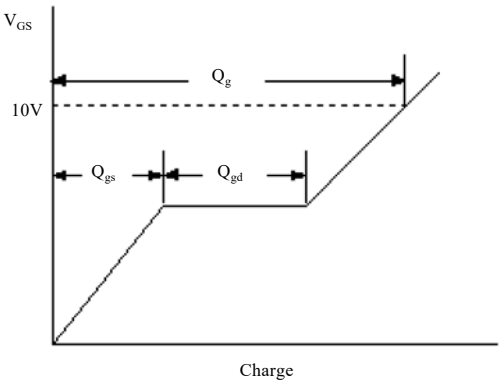


V_{SD}[V]

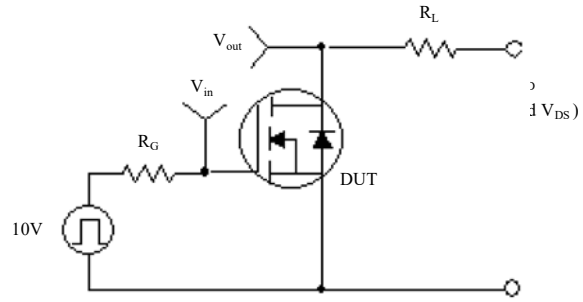
I_F=f(V_{SD}); parameter: T_j

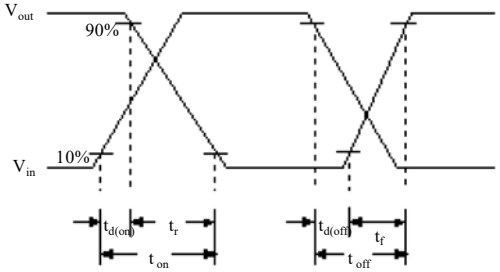
Gate Charge Test Circuit & Waveform



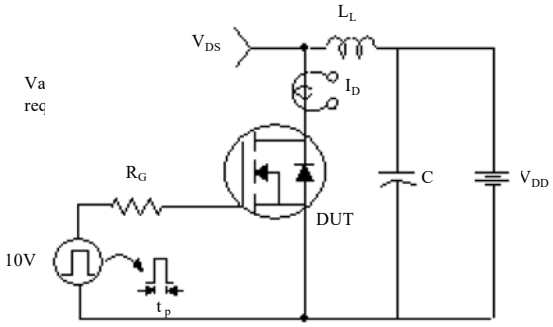


Resistive Switching Test Circuit & Waveforms

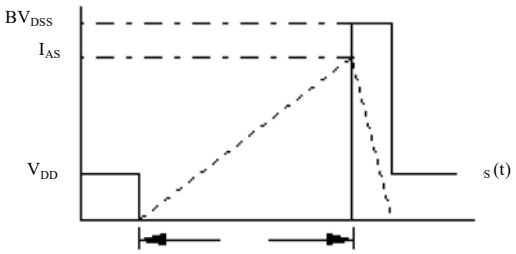




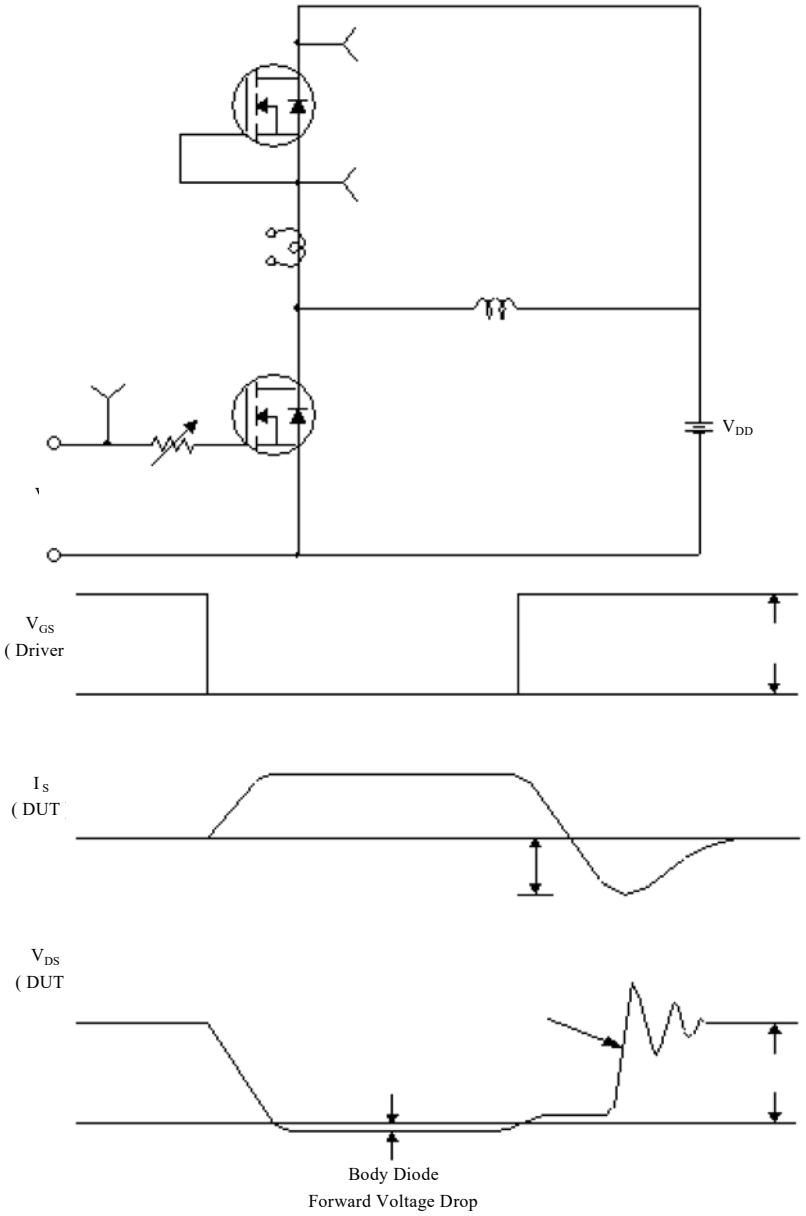
Unclamped Inductive Switching Test Circuit & Waveforms



$$E_{AS} = \frac{1}{2} L_L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$



Peak Diode Recovery dv/dt Test Circuit & Waveforms



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