![Maplesemi logo]

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

SLP80R240SJ TO-220
SLF80R240SJ TO-220F
SLB80R240SJ D2-PAK
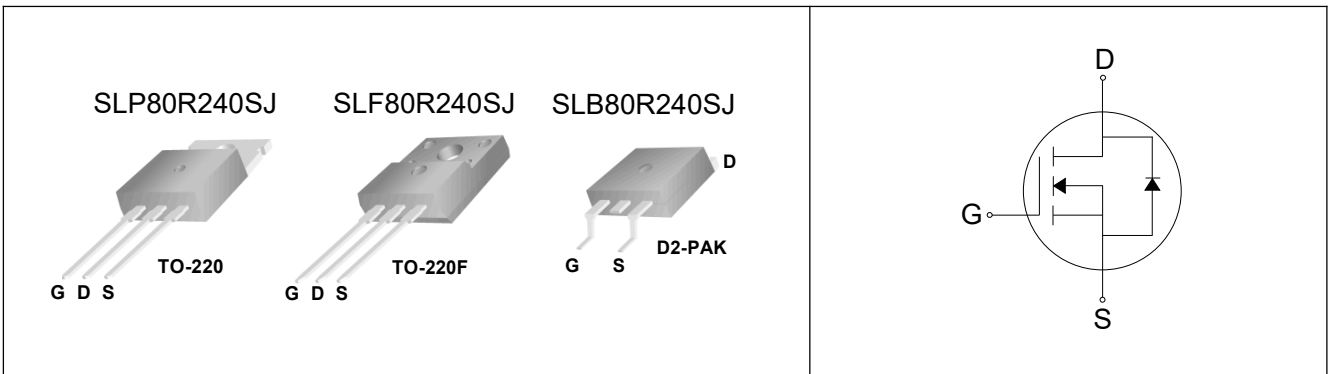
Absolute Maximum Ratings   TC = 25°C unless otherwise noted

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		-	1440	-	
Coss	Output Capacitance	VGS =0 V, VDS =25V, f = 1MHz	-	300	-	pF
Crss	Reverse Transfer Capacitance		-	10	-	
Dynamic Characteristics						
td(on)	Turn-on Delay Time		`	25	-	
tr	Rise Time	VDD =400V, ID =10A, RG =20Ω	-	55	-	nS
td(off)	Turn-off Delay Time		-	70	-	
tf	Fall Time		-	40	-	
Qg	Total Gate Charge		-	70	-	
Qgs	Gate-Source Charge	VDS =480V, VGS =10V, ID =10A	-	7.8	-	nC
Qgd	Gate-Drain Charge(Miller Charge)		-	9	-	

Source-Drain Diode Ratings and Characteristics

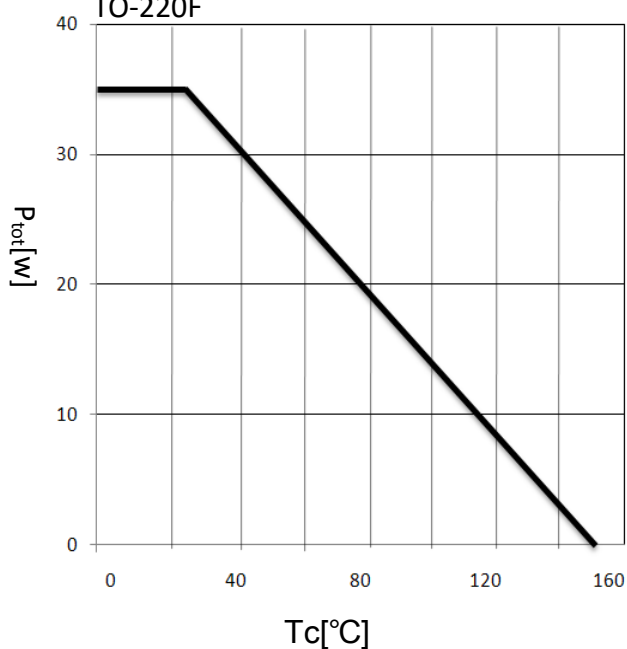| Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit.
IS	Maximum Continuous Drain-Source Diode Forward Current		-	-	20	A
ISM	Maximum Pulsed Drain-Source Diode Forward Current		-	-	60	
VSD	Diode Forward Voltage	IS =10A, VGS =0V	-	1	1.5	V
trr	Reverse Recovery Time	IS =10A, VGS=0V, dIF/dt=100A/us	-	475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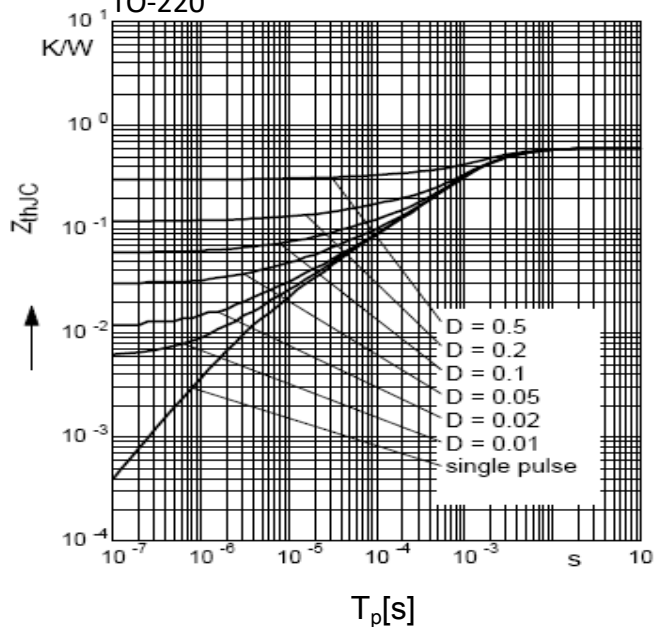
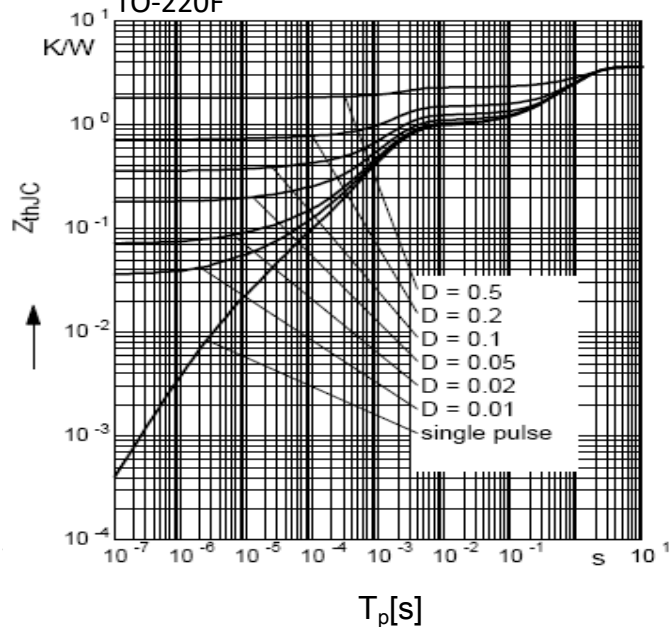# Typical Performance Characteristics

Power dissipation
TO-220
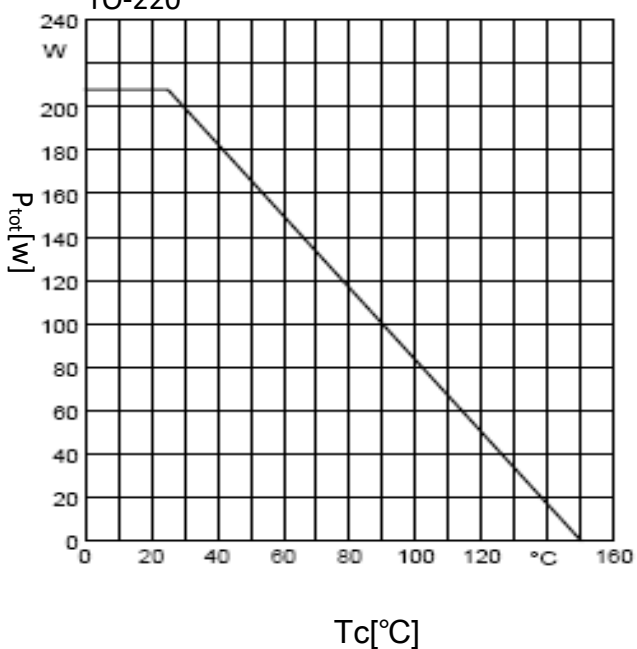
Tc[℃]

Power dissipation
TO-220F

Tc[℃]

Max. transient thermal impedance
TO-220

D = 0.5
D = 0.2
D = 0.1
D = 0.05
D = 0.02
D = 0.01
single pulse

T_p[s]

Max. transient thermal impedance
TO-220F

D = 0.5
D = 0.2
D = 0.1
D = 0.05
D = 0.02
D = 0.01
single pulse

T_p[s]

Typical Performance Characteristics

Safe operating area *TC=25 ℃*

TO-220

Safe operating area *TC=25 ℃*

TO-220F
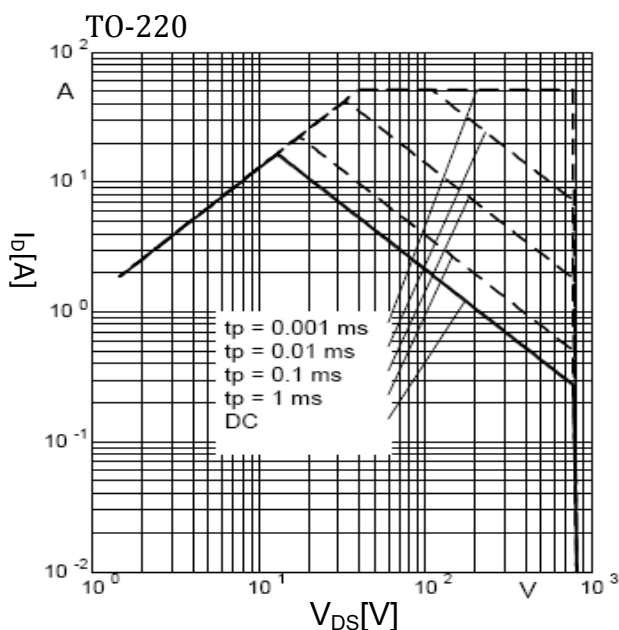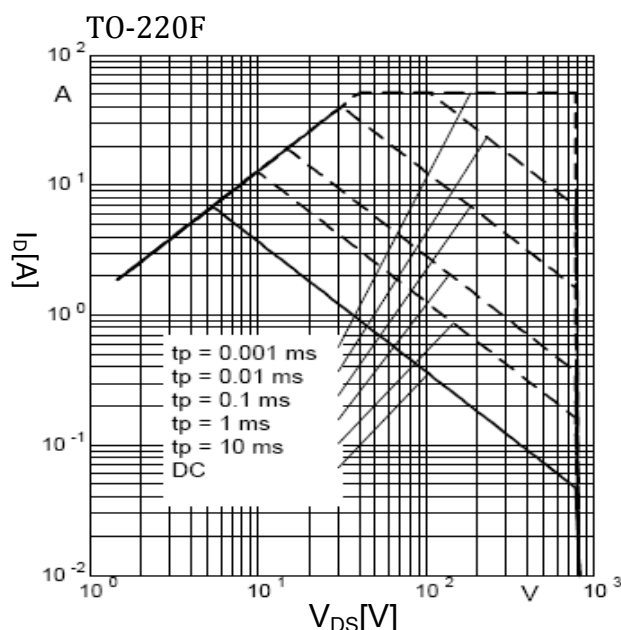
I_D=f(V_{DS}); T$_C$=25 ℃; V$_{GS}$ > 7V; D=0; parameter t$_p$

Safe operating area TC=80 ℃

TO-220

Safe operating area TC=80 ℃

TO-220F
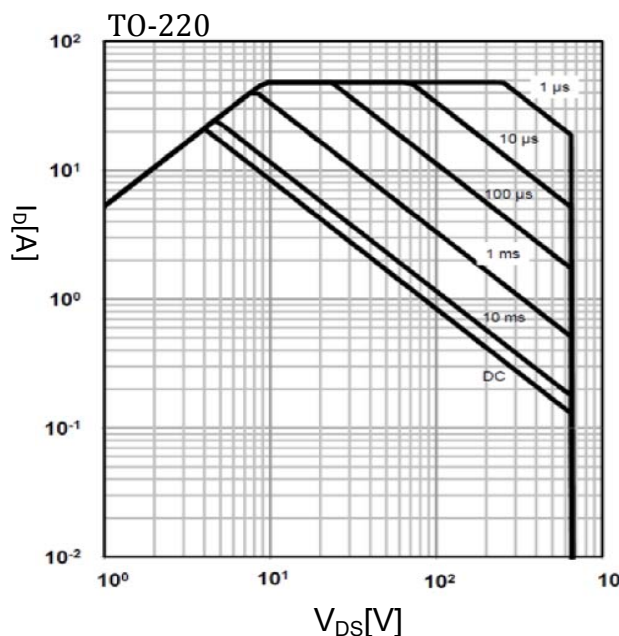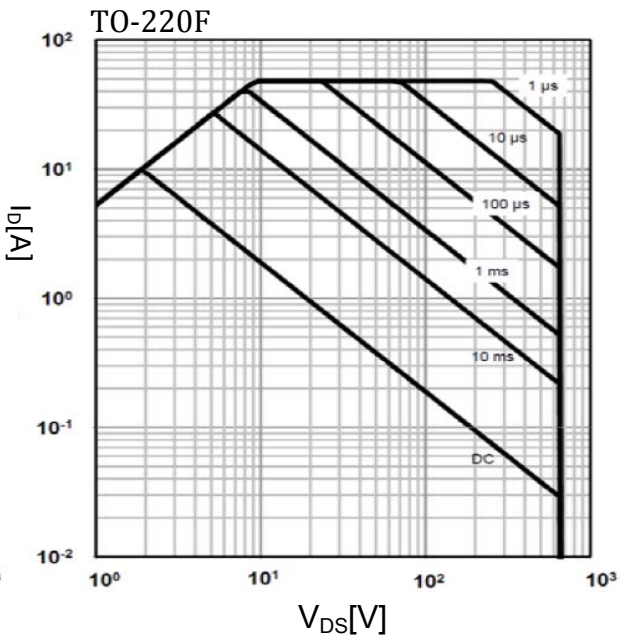
*I*D=f(VDS); TC=80 ℃; VGS > 7V; D=0;

parameter t$_p$

Typical Performance Characteristics

Typ. output characteristics
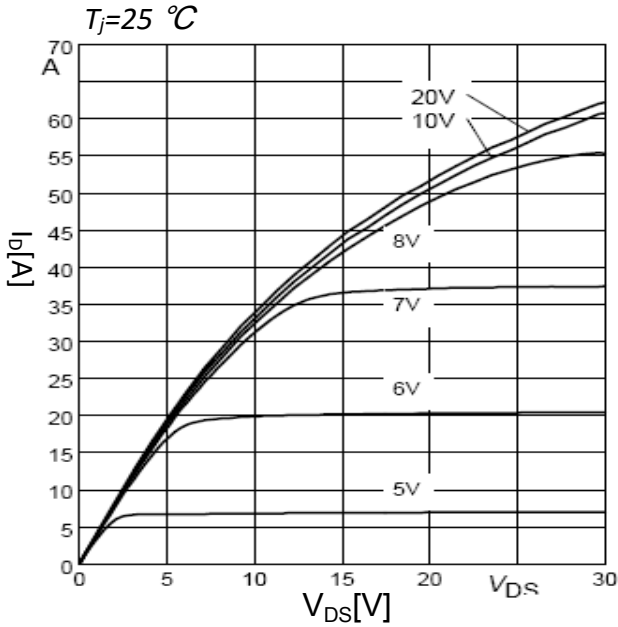
$T_j=25\ ℃$

$I_D=f(V_{DS})$; $T_j=25\ ℃$; 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
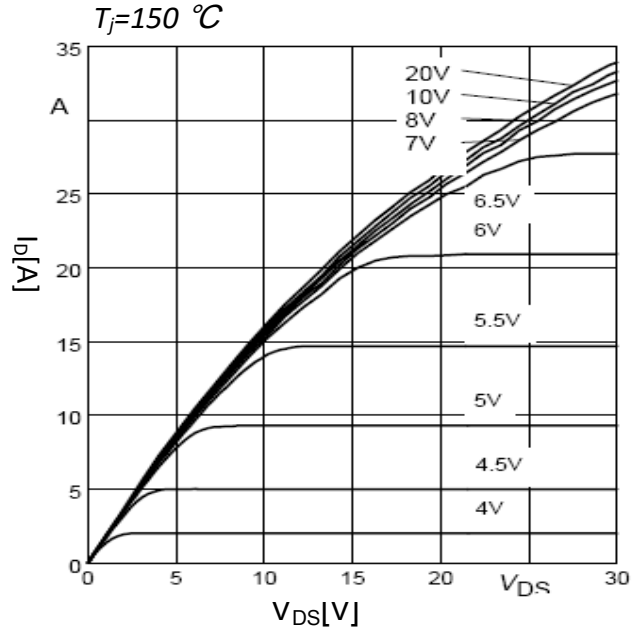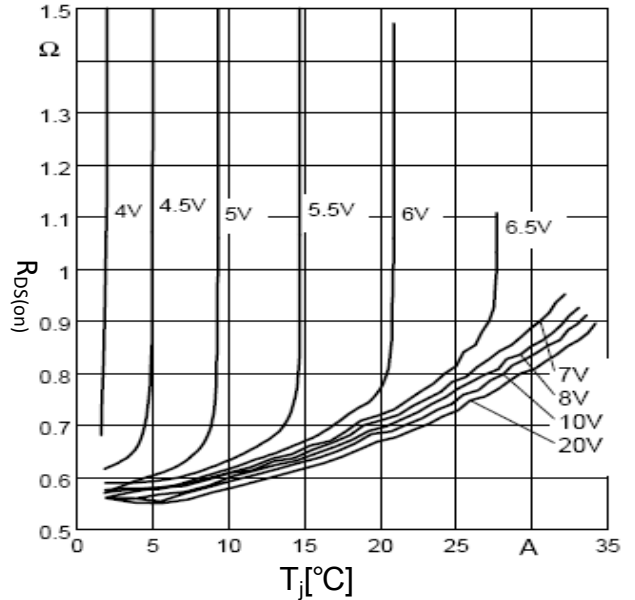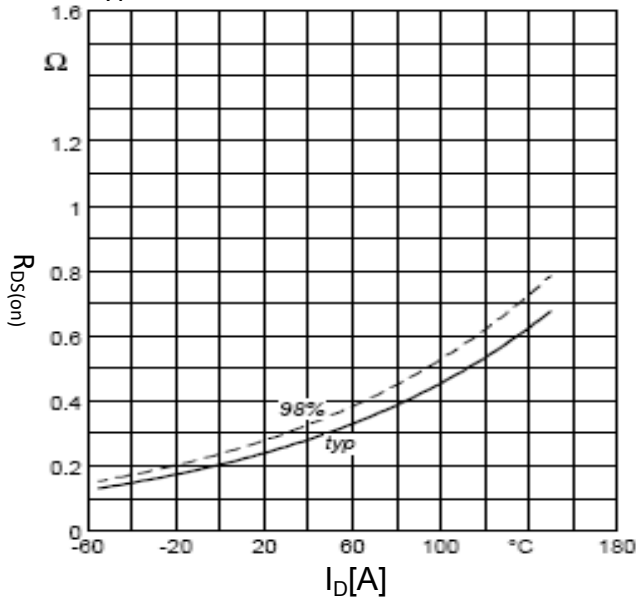
Typical Performance Characteristics

Typ. transfer characteristics
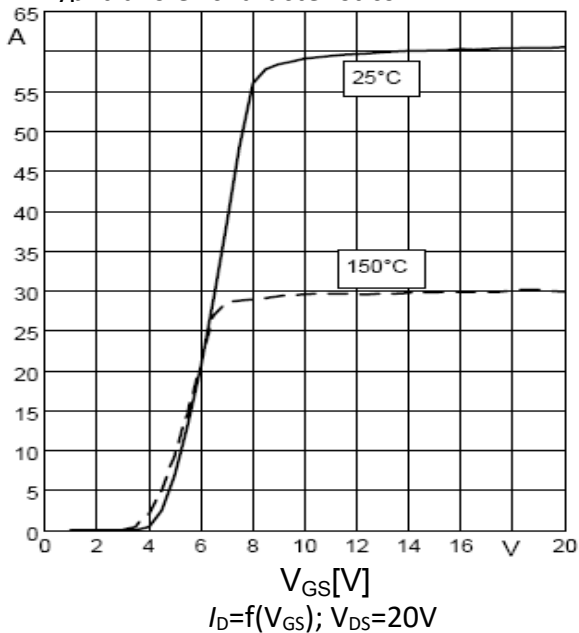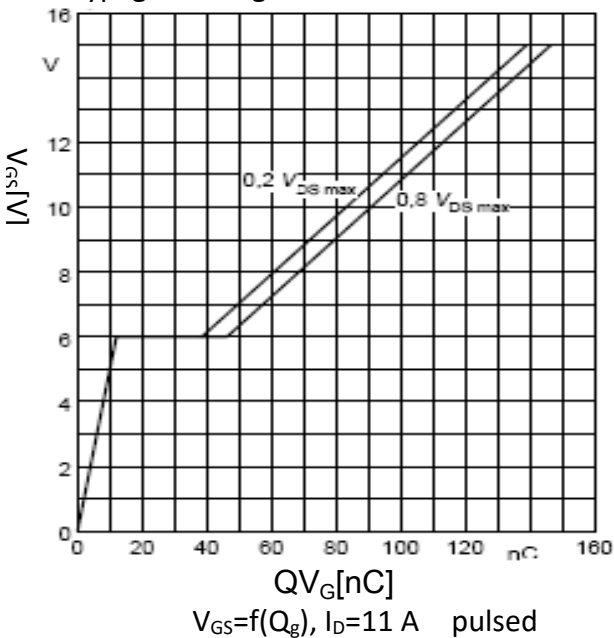
$I_D=f(V_{GS})$; $V_{DS}=20V$

Typ. gate charge

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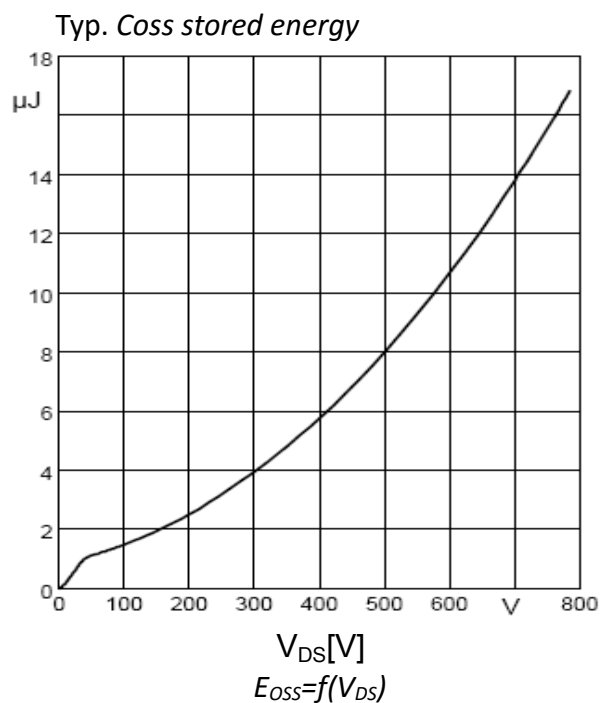
Avalanche energy

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

Drain-source breakdown voltage

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

T_j = 25 °C typ
T_j = 150 °C typ
T_j = 25 °C (98%)
T_j = 150 °C (98%)

$V_{SD}[V]$

$I_F=f(V_{SD})$; parameter: T_j
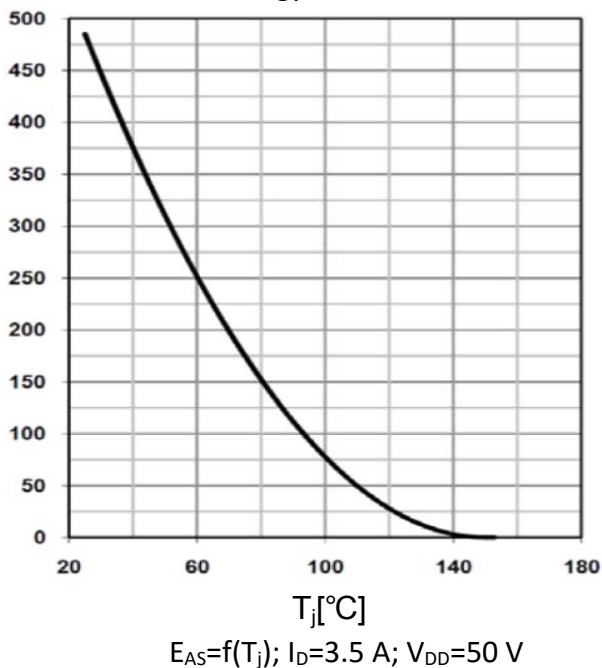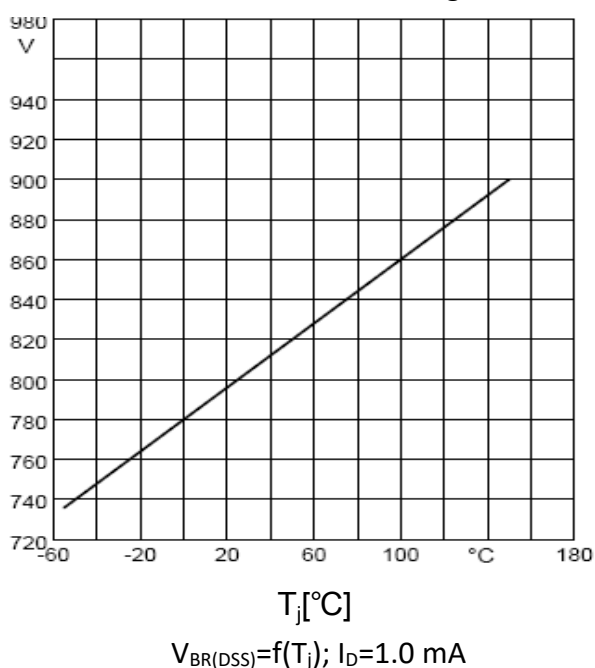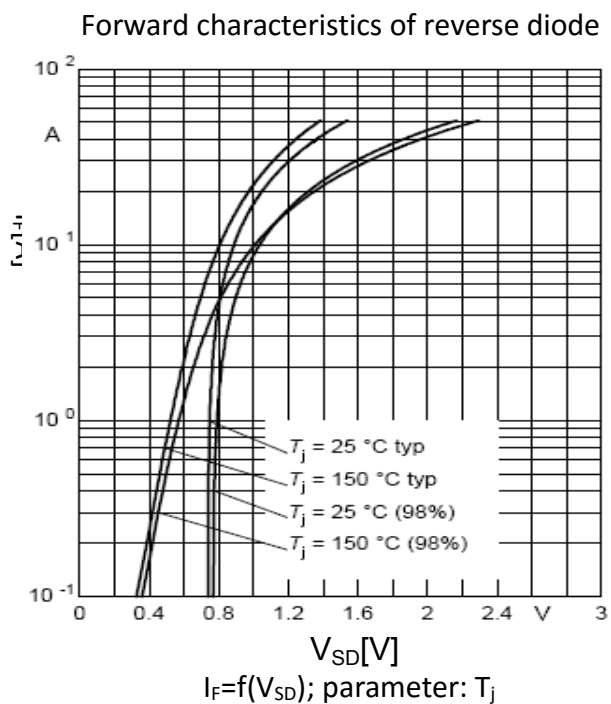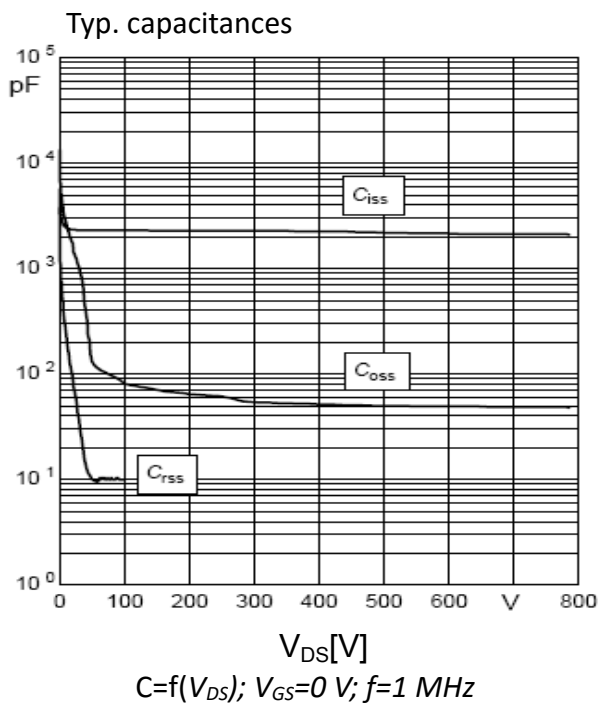
Gate Charge Test Circuit & Waveform

12V

V_{DS}

V_{GS}

Q_g

10V

Q_{gs} Q_{gd}

Charge

Current Sampling (I_G)
Resistor

Current Sampling (I_D)
Resistor

Resistive Switching Test Circuit & Waveforms

R_L

V_{out}

V_{in}

(V_{DS})

R_G

DUT

10V

V_{out}

90%

V_{in} 10%

$t_{d(on)}$ t_r $t_{d(off)}$ t_f

t_{on} t_{off}
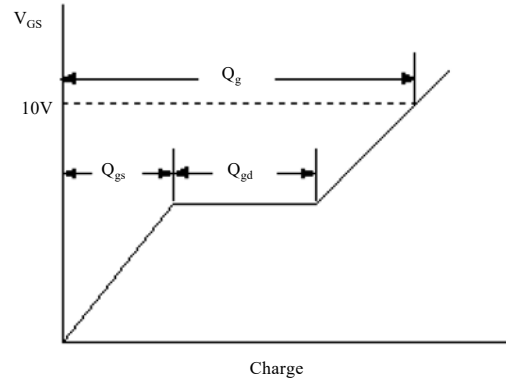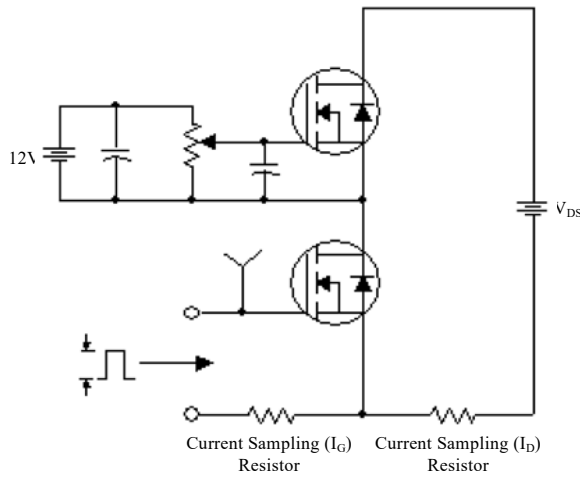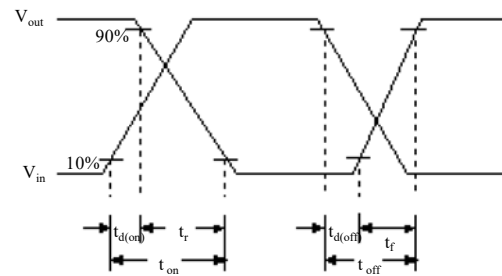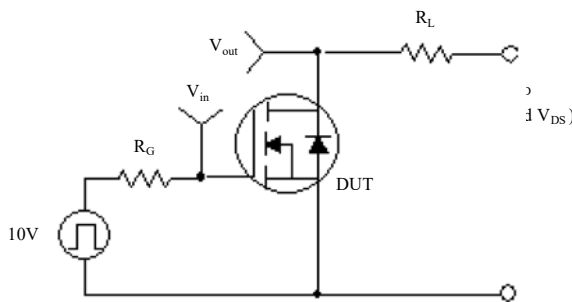
Unclamped Inductive Switching Test Circuit & Waveforms

L_L

V_{DS}

I_D

Va
req

R_G

C V_{DD}

DUT

10V

t_p

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

BV_{DSS}

I_{AS}

V_{DD}

s(t)
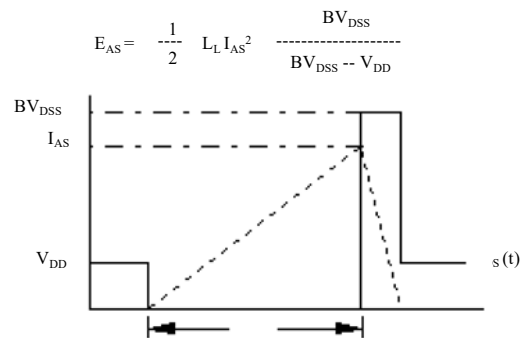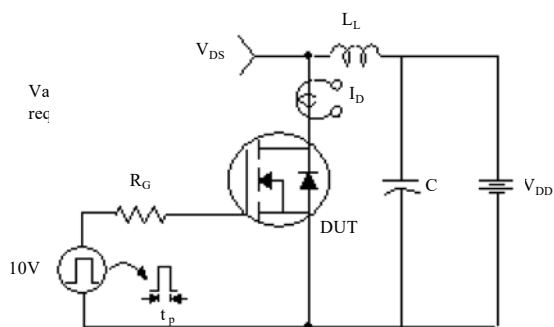
Peak Diode Recovery dv/dt Test Circuit & Waveforms

V_{DD}

V_{GS}
(Driver

I_S
(DUT

V_{DS}
(DUT

Body Diode
Forward Voltage Drop