GSX11N80E

MOSFET

Metal Oxide Semiconductor Field Effect Transistor

Super Junction MOSFET

800V Super-Junction Power Transistor

GSX11N80E

Data Sheet

Ver 1.1

2021-5-8

800V 11A Power MOSFET

Description

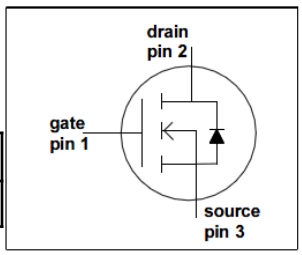
GroupSemiconductor(GS) has series Multi-EPI Super-Junction power MOSFET platforms for voltage up 500V to 1000V, both with design service and manufacturing capability, including cell, termination design and simulation.

The GS 800V 11A Power MOSFET is a Low voltage N channel Multi-EPI Super-Junction 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.

TO-220 TO-220FullPAK TO-263

Features

RDS(ON)=0.6Ω @VGS = 10V
VDS = 800V
ID (@ VGS=10V) = 11A



PKG

GSA11N80E	GSP11N80E	GSB11N80E	GSD11N80E	GSS11N80E
TO-220Fullpak	TO-220	TO-263	TO-252	TO-251

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

Symbol	Parameter	GSP/T/S11N80E	GSA11N80E	Unit
V_{DSS}	Drain-Source Voltage	800		V
I_D	Drain Current -Continuous (TC = 25°C) -Continuous (TC = 100°C)	11* 9*		A
I_{DM}	Drain Current - Pulsed (Note 1)	22*		A
V_{GSS}	Gate-Source voltage	±30		V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	200		mJ
I_{AR}	Avalanche Current (Note 1)	2		A
E_{AR}	Repetitive Avalanche Energy (Note 1)	0.4		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	15		V/ns
dVds/dt	Drain Source voltage slope (Vds=720V)	50		V/ns
P_D	Power Dissipation (TC = 25°C)	37	26	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150		°C
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds	300		°C

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Electrical Characteristics T_C = 25℃ unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA, T_J = 25℃	800	--	--	V
		V_{GS} = 0V, I_D = 250μA, T_J = 150℃	--	850	--	V
ΔBV_{DSS} / Δ_{TJ}	Breakdown Voltage Temperature Coefficient	I_D = 250μA, Referenced to 25℃	--	0.6	--	V/℃
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 800V, V_{GS} = 0V T_C = 25℃	--	--	1	μA
		V_{DS} = 800V, V_{GS} = 0V T_C = 125℃			10	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30V, V_{DS} = 0V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30V, V_{DS} = 0V	--	--	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	2.5	--	4.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10V, I_D = 5A	--	0.55	0.6	Ω
g_{FS}	Forward Trans conductance	V_{DS} = 40V, I_D = 5A (Note 4)	--	16	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	--	680	--	pF
C_{oss}	Output Capacitance		--	60	--	pF
C_{rss}	Reverse Transfer Capacitance		--	15	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 400V, I_D = 5A R_G = 20Ω(Note 4, 5)	--	15	--	ns
t_r	Turn-On Rise Time		--	10	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	110	--	ns
t_f	Turn-Off Fall Time		--	10	--	ns
Q_g	Total Gate Charge	V_{DS} = 480V, I_D = 5A V_{GS} = 10V (Note 4, 5)	--	38	90	nC
Q_{gs}	Gate-Source Charge		--	4	--	nC
Q_{gd}	Gate-Drain Charge		--	4.5	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	11	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	30	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0V, I_F = 5A	--	1	1.5	V
t_{rr}	Reverse Recovery Time	V_R = 400V, I_F = 5A di_F/dt =100A/μs (Note 4)	--	475	--	ns
Q_{rr}	Reverse Recovery Charge		--	5.8	--	μC
I_{rrm}	Peak reverse recovery Current		--	35	--	A

NOTES:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L=79mH, I_{AS}=3.5A, V_{DD}=50V, Starting TJ=25 ℃
3. I_{SD}≤ID, di/dt ≤ 200A/us, V_{DD} ≤ BV_{DSS}, Starting TJ = 25 ℃
4. Pulse Test: Pulse width ≤ 300us, Duty Cycle ≤ 2%
5. Essentially Independent of Operating Temperature Typical Characteristics

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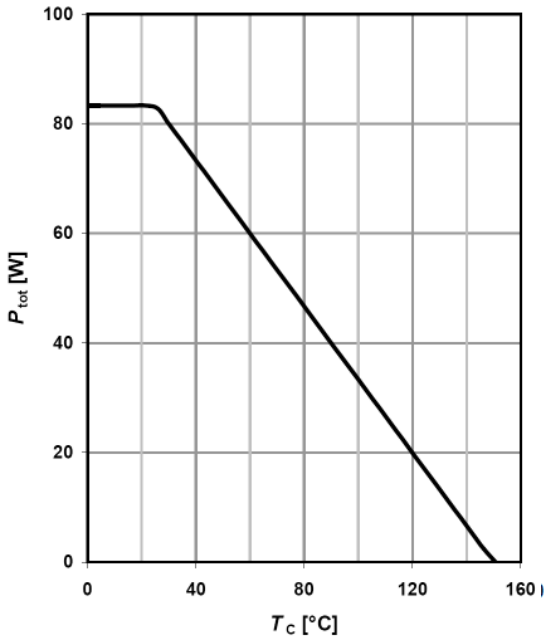
SEMICONDUCTOR

Typical Performance Characteristics

1 Power dissipation

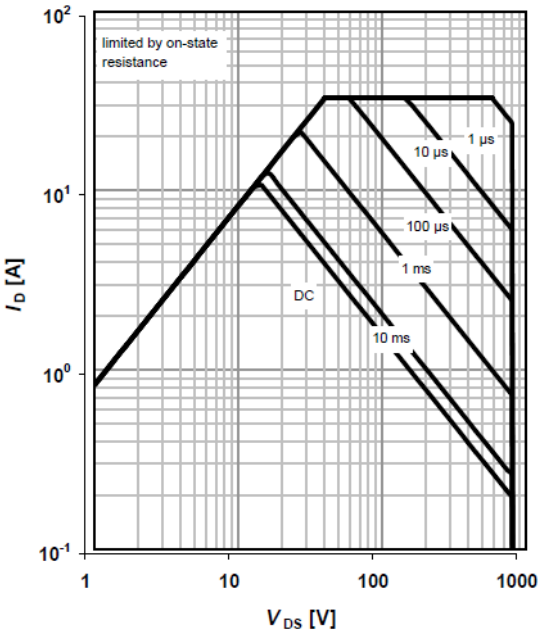
$P_{tot}=f(T_C)$



2 Safe operating area

$I_D=f(V_{DS})$; $T_C=25$ °C; $D=0$

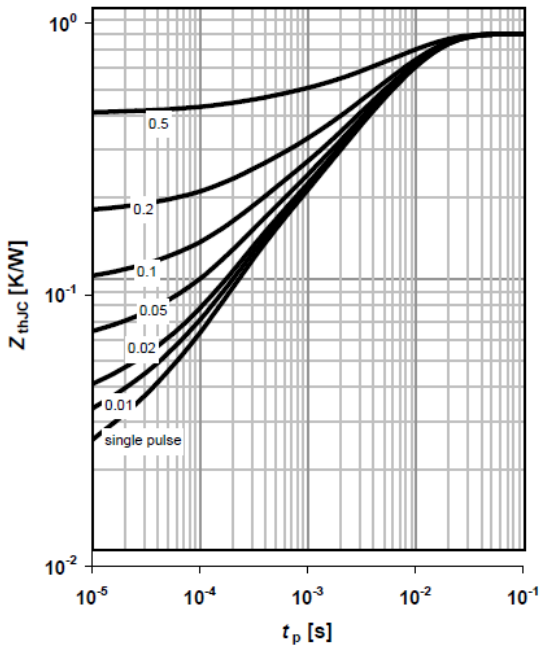
parameter: t_p



3 Max. transient thermal impedance

$Z_{thJC}=f(t_P)$

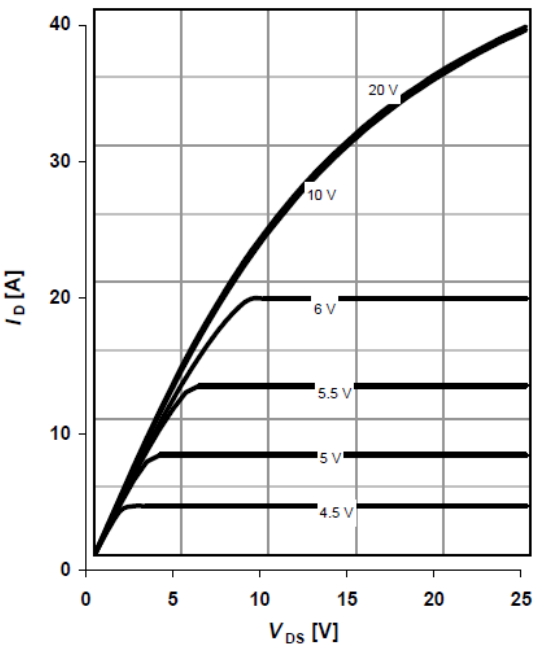
parameter: $D=t_p/T$



4 Typ. output characteristics

$I_D=f(V_{DS})$; $T_j=25$ °C; $t_p=10$ µs

parameter: V_{GS}



Typical Performance Characteristics

1 Power dissipation

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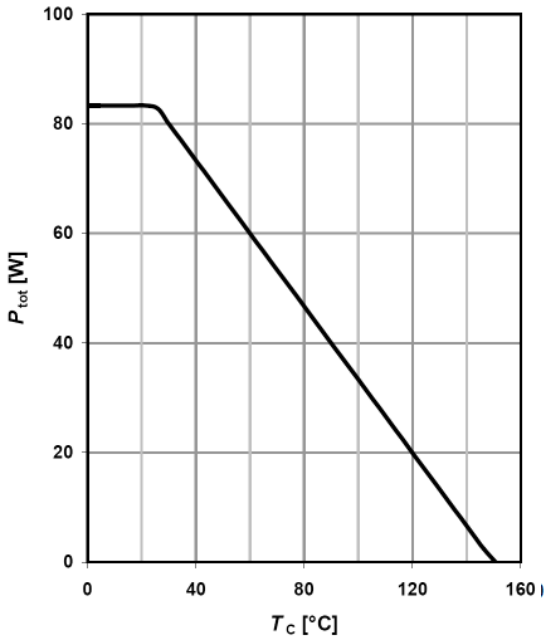
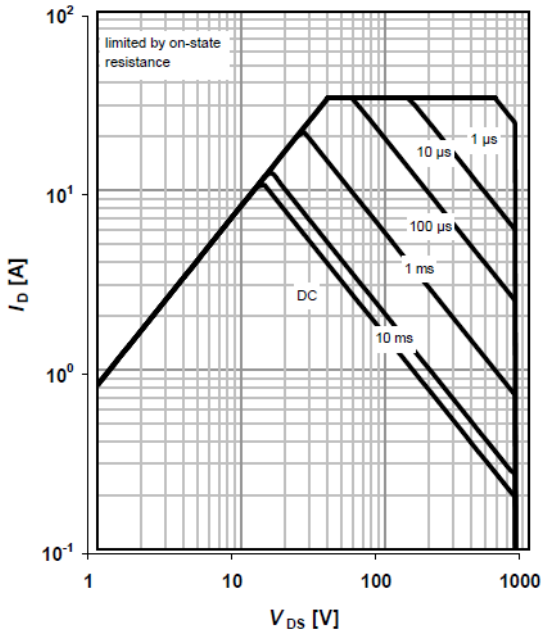


2 Safe operating area

I_D=f(V_{DS}); T_C=25 °C; D=0

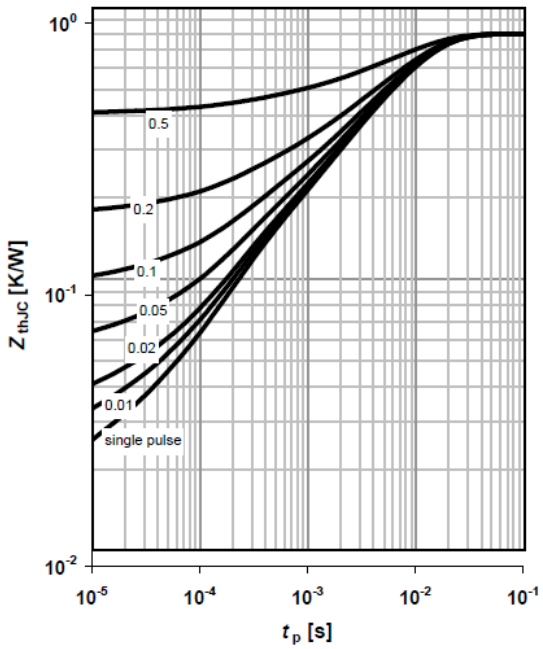
parameter: t_p



3 Max. transient thermal impedance

Z_{thJC}=f(t_P)

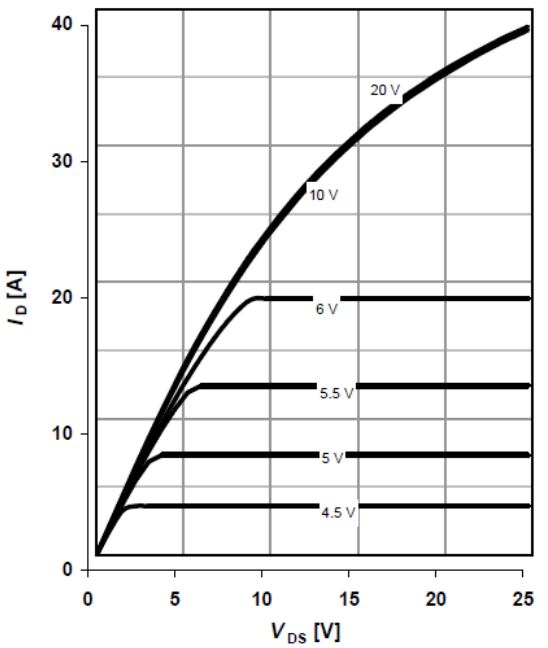
parameter: D=t_p/T



4 Typ. output characteristics

I_D=f(V_{DS}); T_j=25 °C; t_p=10 µs

parameter: V_{GS}

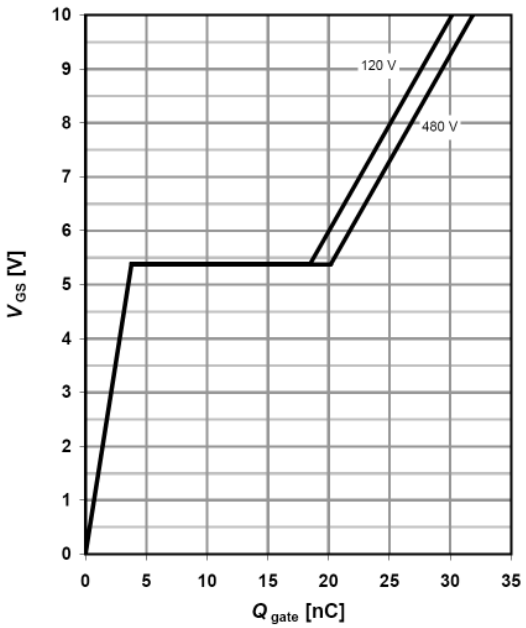


Typical Performance Characteristics

9 Typ. gate charge

V_{GS}=f(Q_{gate}); I_D=11 A pulsed

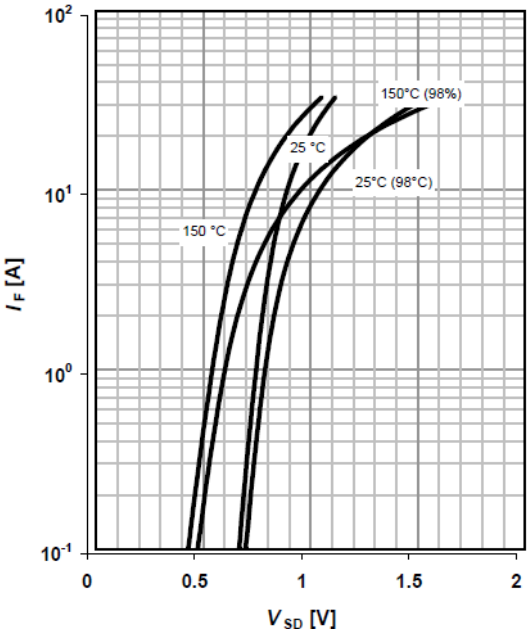
parameter: V_{DD}



10 Forward characteristics of reverse diode

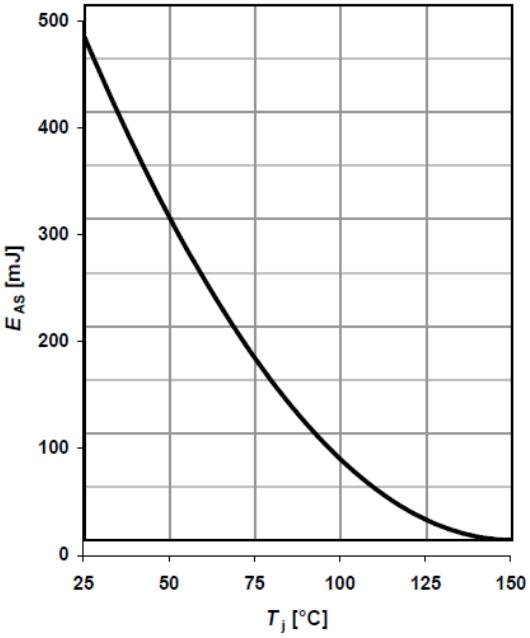
I_F=f(V_{SD}); t_p=10 µs

parameter: T_j



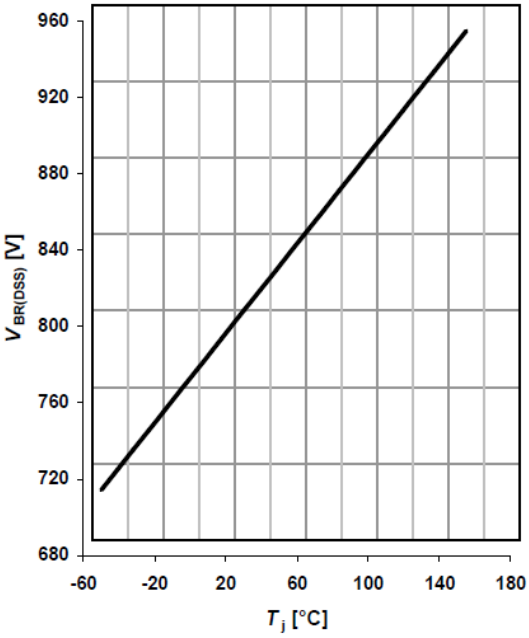
11 Avalanche energy

E_{AS}=f(T_j); I_D=2.2 A; V_{DD}=50 V



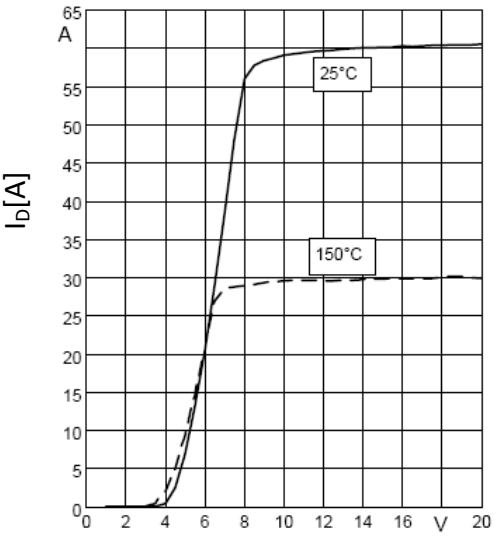
12 Drain-source breakdown voltage

$V_{BR(DSS)}$=f(T_j); I_D=0.25 mA



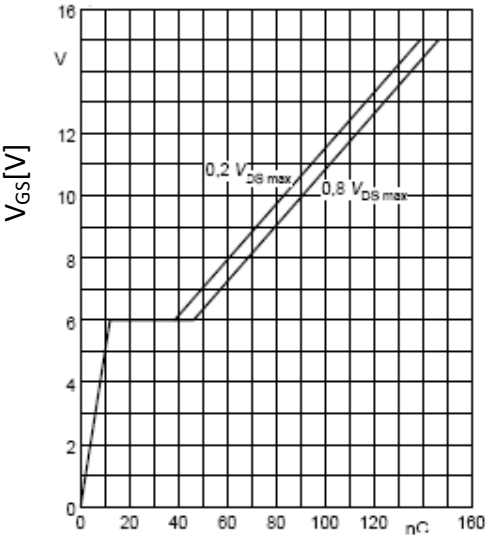
Typical Performance Characteristics

Typ. transfer characteristics



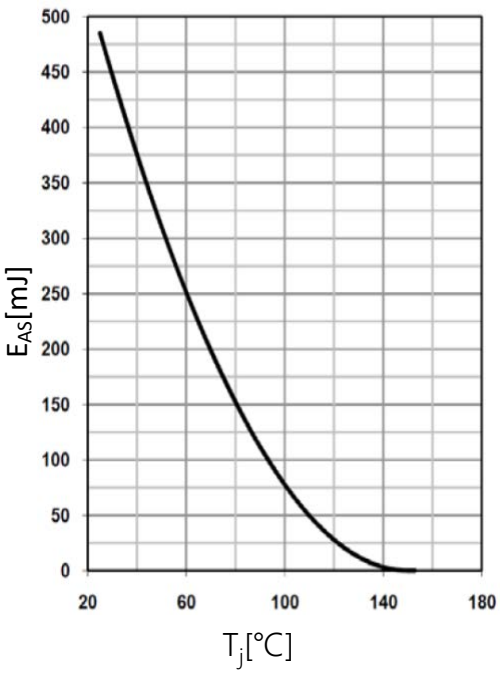
I_D=f(V_{GS}); V_{DS}=20V

Typ. gate charge



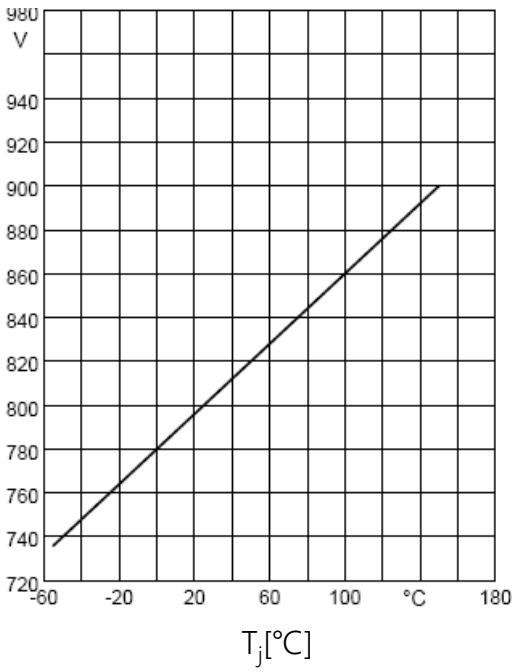
V_{GS}=f(Q_g), I_D=11 A pulsed

Avalanche energy



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

Drain-source breakdown voltage

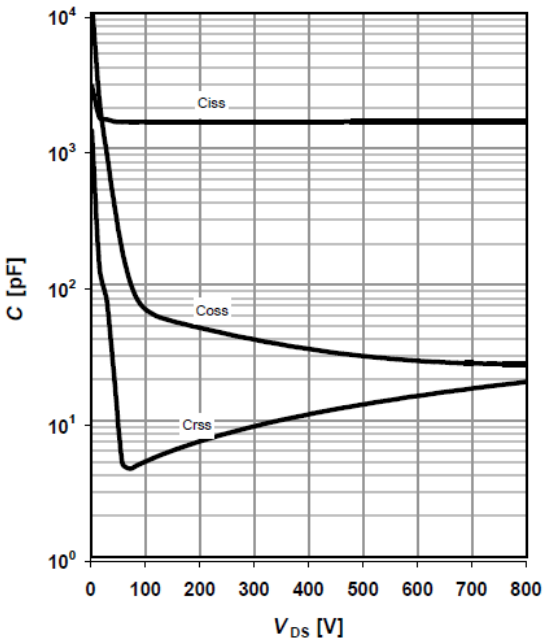


$V_{BR(DSS)}$=f(T_j); I_D=1.0 mA

Typical Performance Characteristics

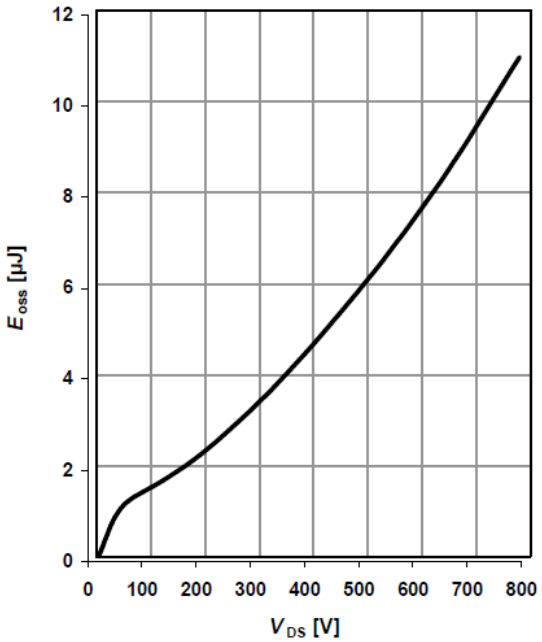
13 Typ. capacitances

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



14 Typ. Coss stored energy

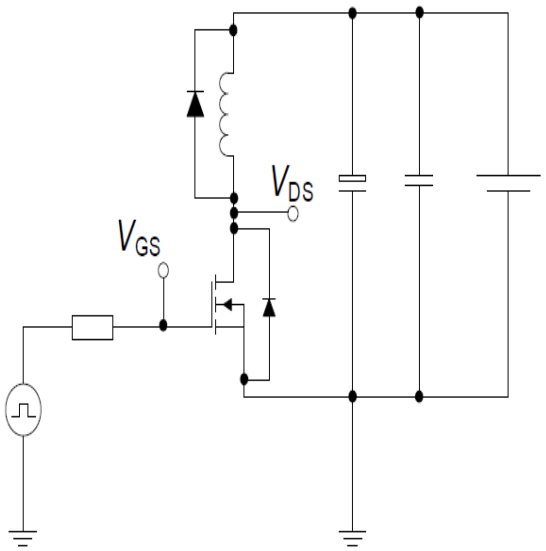
$E_{oss}=f(V_{DS})$



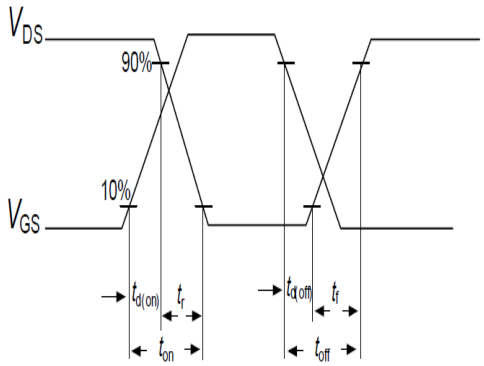
Test circuits

Switching times test circuit and waveform for inductive load

Switching times test circuit for inductive load

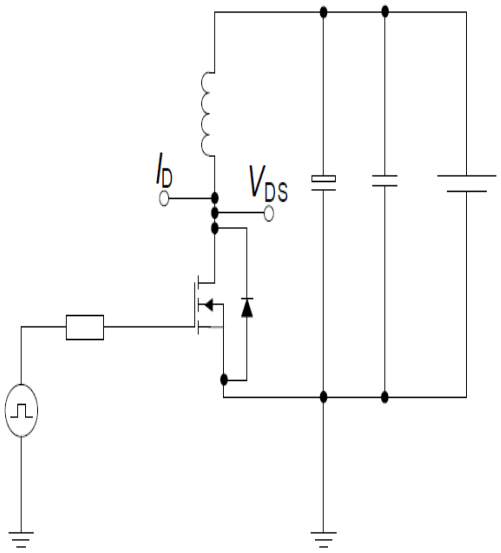


Switching time waveform

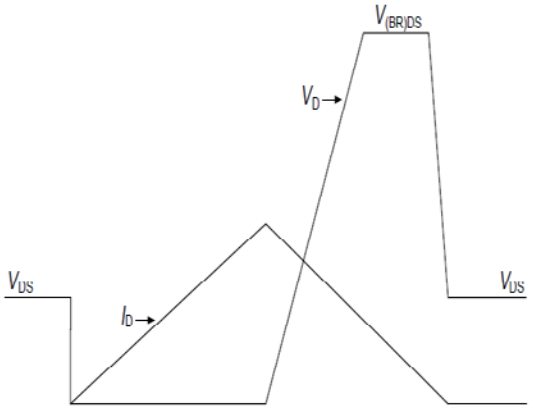


Unclamped inductive load test circuit and waveform

Unclamped inductive load test circuit



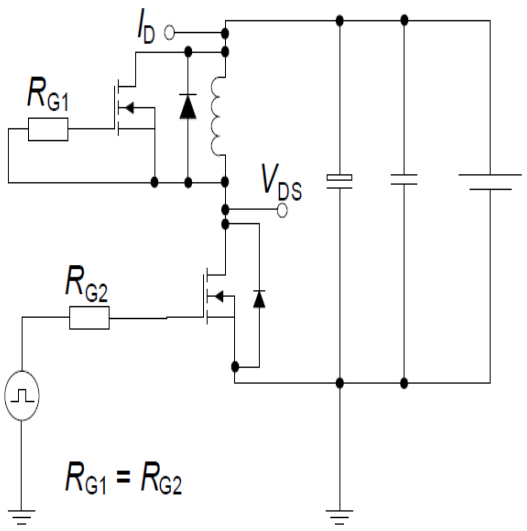
Unclamped inductive waveform



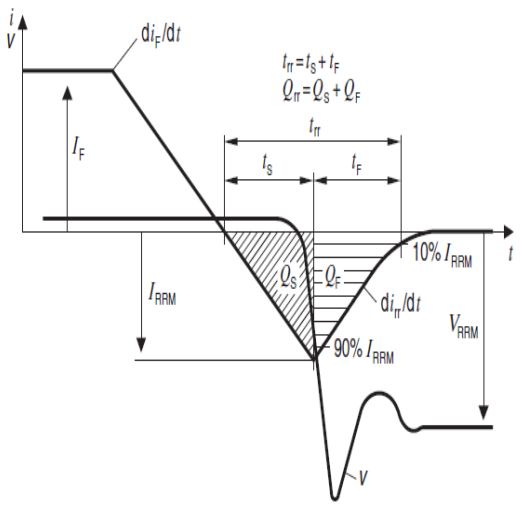
Test circuits

Test circuit and waveform for diode characteristics

Test circuit for diode characteristics



Diode recovery waveform



GROUP
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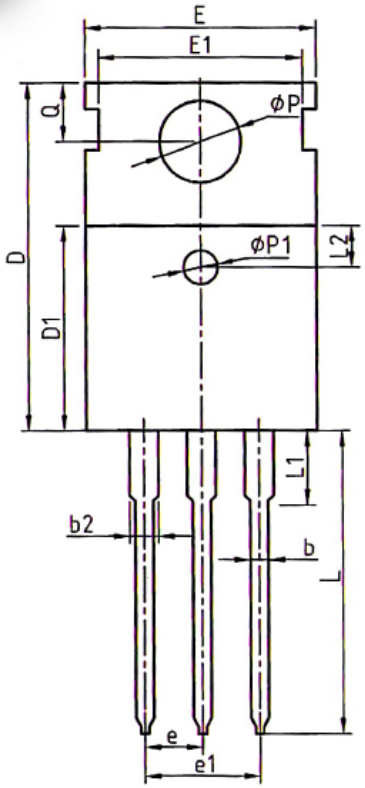
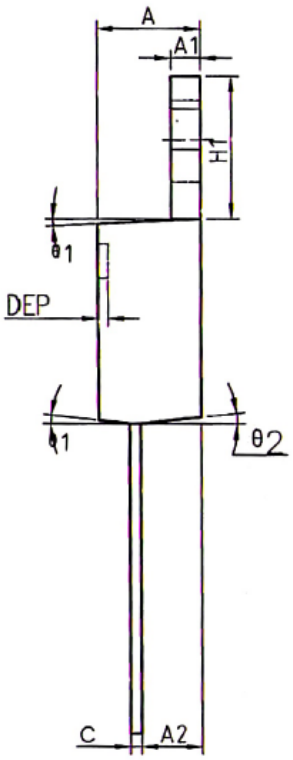
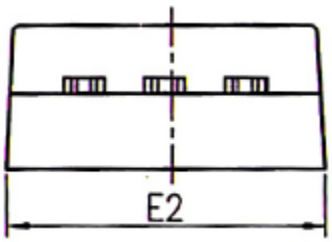
Package Outline

TO-220







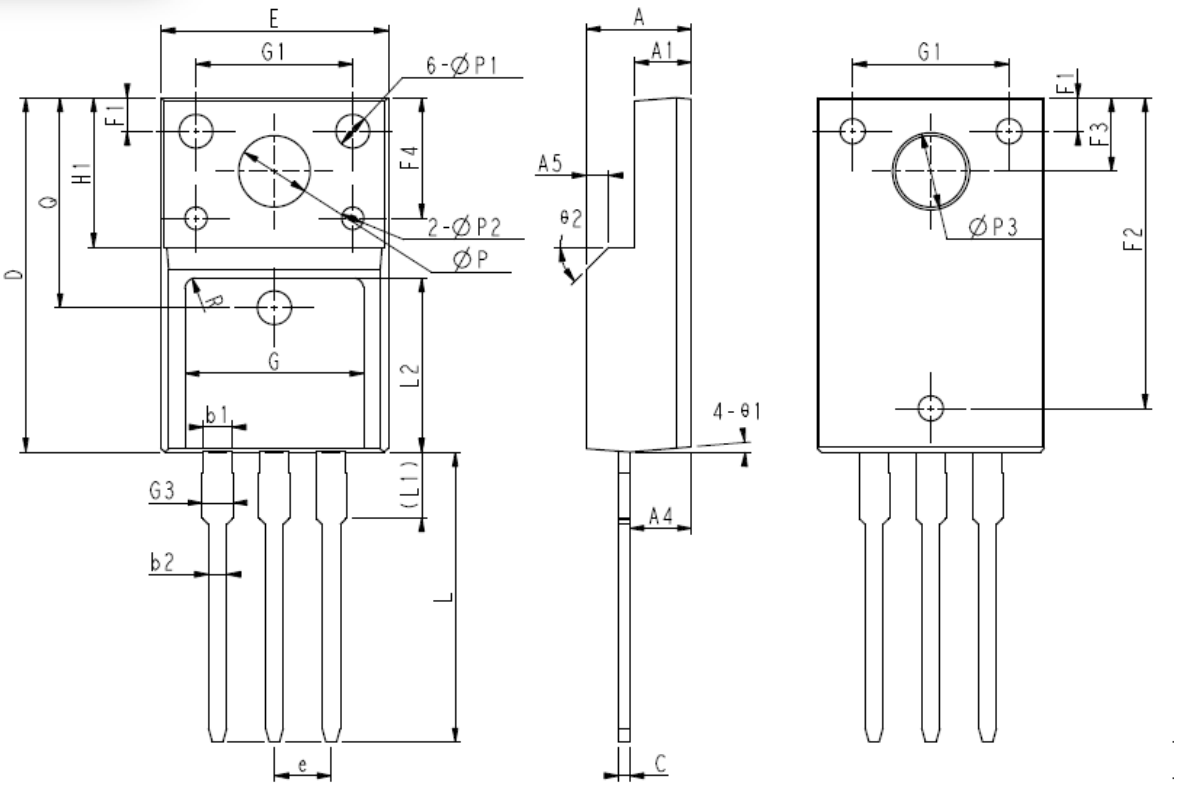
COMMON DIMENIONS

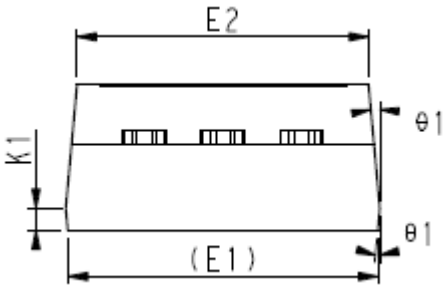
SYMBOL	MM		
	MIN	NOM	MAX
A	4.40	4.57	4.70
A1	1.27	1.30	1.37
A2	2.35	2.40	2.50
b	0.77	0.80	0.90
b2	1.17	1.27	1.36
c	0.48	0.50	0.56
D	15.40	15.60	15.80
D1	9.00	9.10	9.20
DEP	0.05	0.10	0.20
E	9.80	10.00	10.20
E1	–	8.70	–
E2	9.80	10.00	10.20
ΦP1	1.40	1.50	1.60
e	2.54BSC		
e1	5.08BSC		
H1	6.40	6.50	6.60
L	12.75	13.50	13.65
L1	–	3.10	3.30
L2		2.50REF	
ΦP	3.50	3.60	3.63
Q	2.73	2.80	2.87
θ1	5°	7°	9°
θ2	1°	3°	5°
θ3	1°	3°	5°

GROUP
SEMICONDUCTOR

ckage Outline

-220 Full PAK



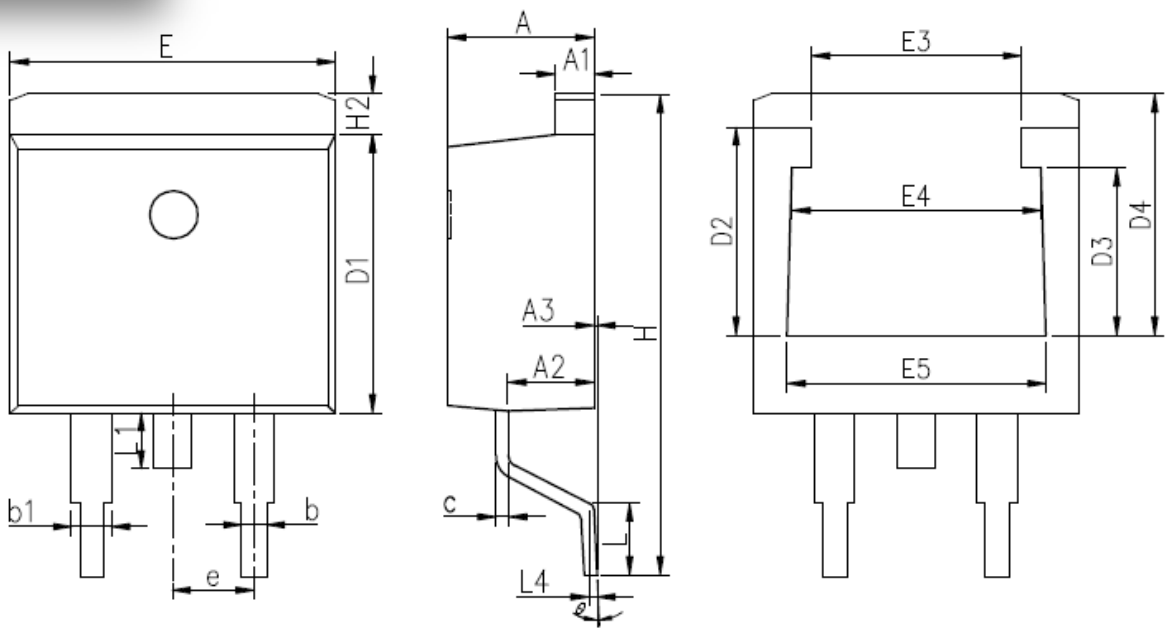


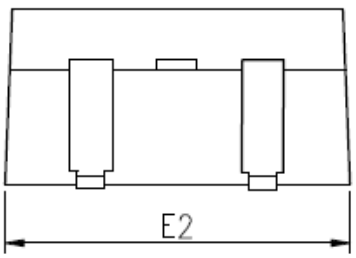
COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
E	10.00	10.16	10.32
E1	9.94	10.04	10.14
E2	9.36	9.46	9.56
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A4	2.66	2.76	2.86
A5		1.00REF	
c	0.45	0.50	0.60
D	15.67	15.87	16.07
Q		9.40REF	
H1		6.70REF	
e		2.54BSC	
ΦP		3.18REF	
L	12.78	12.98	13.18
L1	2.83	2.93	3.03
L2	7.70	7.80	7.90
ΦP1	1.40	1.50	1.60
ΦP2	0.95	1.00	1.05
ΦP3		3.45REF	
θ1	3°	5°	7°
θ2	-	45°	-
F1	1.00	1.50	2.00
F2	13.80	13.90	14.00
F3	3.20	3.30	3.40
F4	5.30	5.40	5.50
G	7.80	8.00	8.20
G1	6.90	7.00	7.10
G3	1.25	1.35	1.45
b1	1.23	1.28	1.38
b2	0.75	0.80	0.90
K1	0.65	0.70	0.75
R		0.50REF	

GROUP
SEMICONDUCTOR

ckage Outline
-263





COMMON DIMENSIONS

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	MIN	NOM	MAX
A	4.27	4.57	4.87
A1	1.22	1.27	1.42
A2	2.39	2.69	2.99
A3	0.00	0.13	0.20
b	0.70	0.81	1.01
b1	1.17	1.27	1.50
c	0.30	0.38	0.53
D1	8.40	8.70	9.00
D2	5.33	6.33	6.63
D3	4.54	5.54	5.84
D4	6.60	7.60	8.00
E	9.88	10.16	10.50
E2	9.80	10.10	10.40
E3	4.94	5.94	6.24
E4	6.67	7.67	7.97
E5	7.06	8.06	8.36
e		2.54 BSC	
H	14.70	15.10	15.50
H2	1.00	1.27	1.50
L	2.00	2.30	2.60
L1	1.35	1.55	1.75
L4		0.25 BSC	
θ	0°	5°	9°