

### ● General Description

The AGM40N20F combines advanced trench MOSFET technology with a low resistance package to provide extremely low  $R_{DS(ON)}$ .

This device is ideal for load switch and battery protection applications.

### ● Features

- Advance high cell density Trench technology
- Low  $R_{DS(ON)}$  to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance

### ● Application

- MB/VGA Vcore
- SMPS 2<sup>nd</sup> Synchronous Rectifier
- POL application
- BLDC Motor driver

### Product Summary

BVDSS	RDS(ON)	ID
200V	47mΩ	40A

### TO-220F Pin Configuration



### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AGM40N20F	AGM40N20F	TO-220F	----	----	1000

**Table 1. Absolute Maximum Ratings (TC=25°C)**

Symbol	Parameter	Value	Unit
VDS	Drain-Source Voltage (VGS=0V)	200	V
VGS	Gate-Source Voltage (VDS=0V)	±20	V
ID	Drain Current-Continuous(Tc=25°C) <b>(Note 1)</b>	40	A
	Drain Current-Continuous(Tc=100°C)	24	A
IDM (pulse)	Drain Current-Continuous@ Current-Pulsed <b>(Note 2)</b>	160	A
PD	Maximum Power Dissipation(Tc=25°C)	100	w
	Maximum Power Dissipation(Tc=100°C)	50	w
EAS	Avalanche energy <b>(Note 3)</b>	1200	mJ
TJ,TSTG	Operating Junction and Storage Temperature Range	-55 To 150	°C

**Table 2. Thermal Characteristic**

Symbol	Parameter	Typ	Max	Unit
RθJA	Thermal Resistance Junction-ambient (Steady State) <sup>1</sup>	---	62	°C/W
RθJC	Thermal Resistance Junction-Case <sup>1</sup>	---	1.0	°C/W

**Table 3. Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

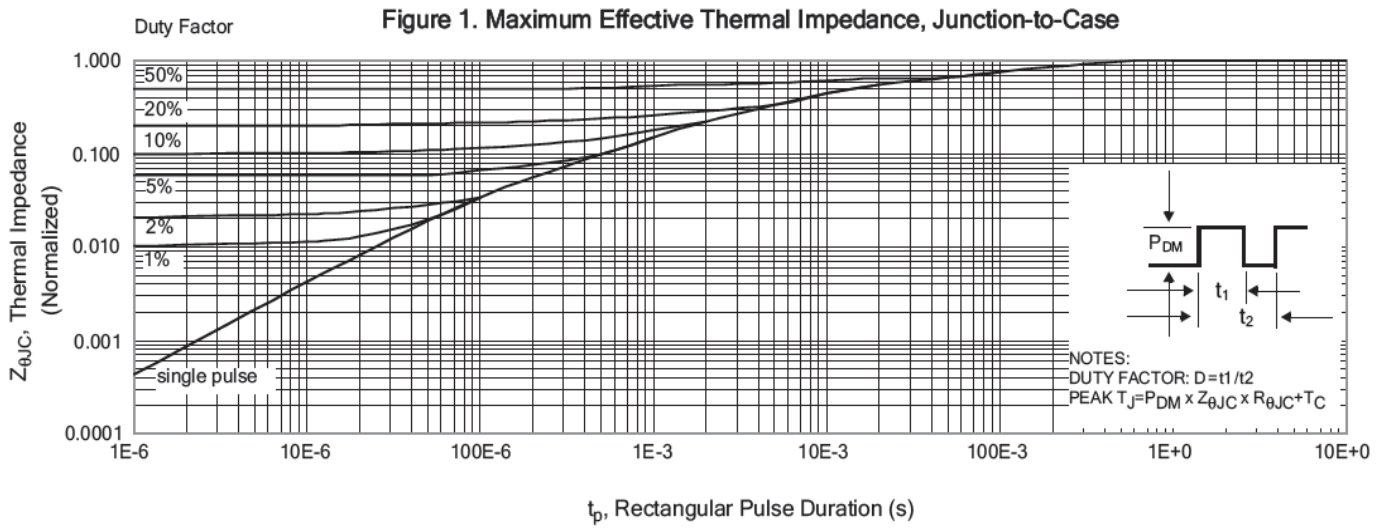
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>On/Off States</b>						
BVDSS	Drain-Source Breakdown Voltage	VGS=0V ID=250μA	200	--	--	V
IDSS	Zero Gate Voltage Drain Current	VDS=200V,VGS=0V	--	--	1	μA
IGSS	Gate-Body Leakage Current	VGS=±20V,VDS=0V	--	--	±100	nA
VGS(th)	Gate Threshold Voltage	VDS=VGS,ID=250μA	2	--	4	V
gFS	Forward Transconductance	VDS=10V,ID=15A	--	65	--	S
RDS(on)	Drain-Source On-State Resistance	VGS=10V, ID=20A	--	47	65	mΩ
		VGS=4.5V, ID=15A	--	--	--	mΩ
<b>Dynamic Characteristics</b>						
Ciss	Input Capacitance	VDS=25V, VGS=0V, F=1MHZ	--	2800	--	pF
Coss	Output Capacitance		--	110	--	pF
Crss	Reverse Transfer Capacitance		--	305	--	pF
Rg	Gate resistance	VGS=0V, VDS=0V,f=1.0MHz	--	--	--	Ω
<b>Switching Times</b>						
td(on)	Turn-on Delay Time	VGS=10V,VDS=100V, ID=20A, RGEN=3.9Ω	--	20	--	nS
tr	Turn-on Rise Time		--	30	--	nS
td(off)	Turn-Off Delay Time		--	65	--	nS
tf	Turn-Off Fall Time		--	25	--	nS
Qg	Total Gate Charge	VGS=10V, VDS=100V, ID=20A	--	97	--	nC
Qgs	Gate-Source Charge		--	14	--	nC
Qgd	Gate-Drain Charge		--	39	--	nC
<b>Source-Drain Diode Characteristics</b>						
ISD	Source-Drain Current(Body Diode)		--	--	40	A
VSD	Forward on Voltage	VGS=0V,IS=20A	--	--	1.3	V
trr	Reverse Recovery Time	IF=20A , dl/dt=100A/μs , TJ=25°C	--	280	--	ns
Qrr	Reverse Recovery Charge		--	420	--	nc

Notes 1.The maximum current rating is package limited.

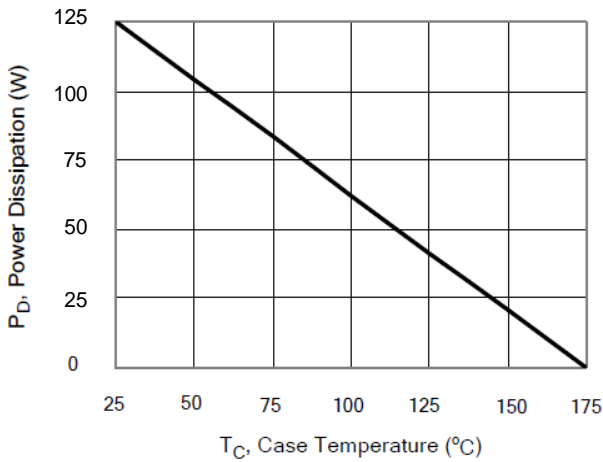
Notes 2.Repetitive Rating: Pulse width limited by maximum junction temperature

Notes 3.EAS condition: T<sub>J</sub>=25°C

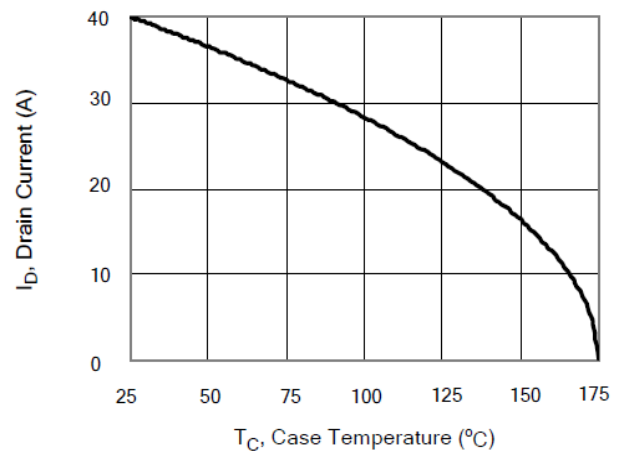
## Typical Characteristics



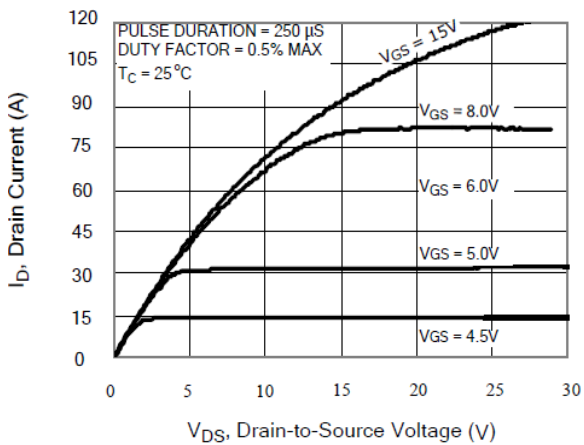
**Figure 2. Maximum Power Dissipation vs Case Temperature**



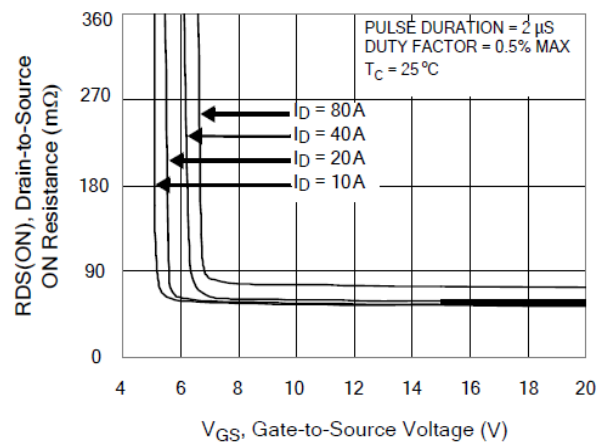
**Figure 3. Maximum Continuous Drain Current vs Case Temperature**



**Figure 4. Typical Output Characteristics**



**Figure 5. Typical Drain-to-Source ON Resistance vs Gate Voltage and Drain Current**



## Typical Characteristics(Cont.)

Figure 6. Maximum Peak Current Capability

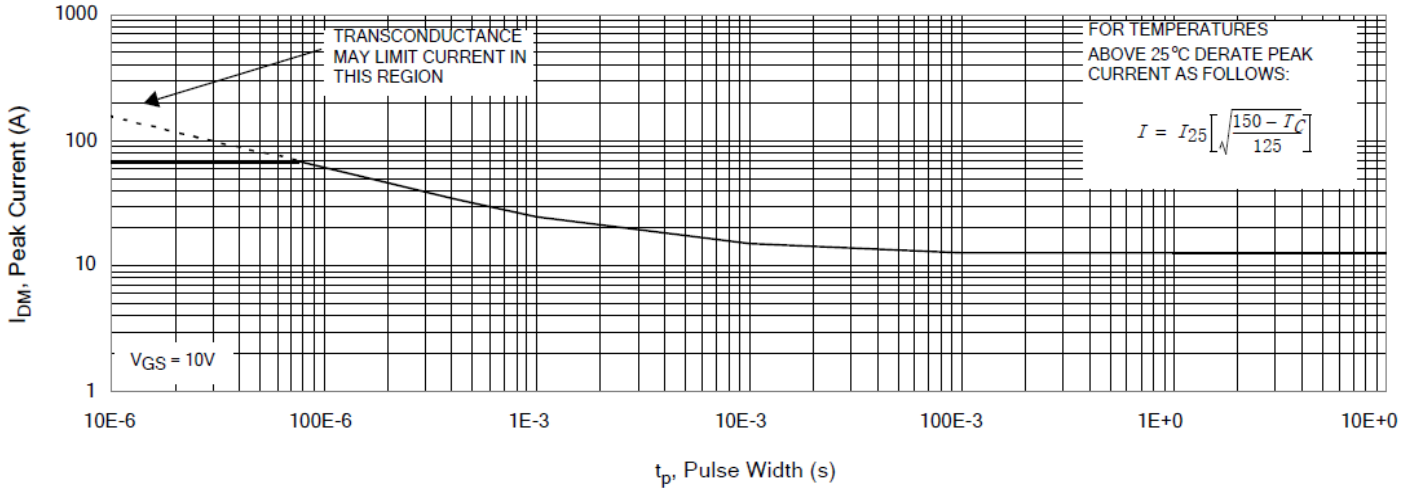


Figure 7. Typical Transfer Characteristics

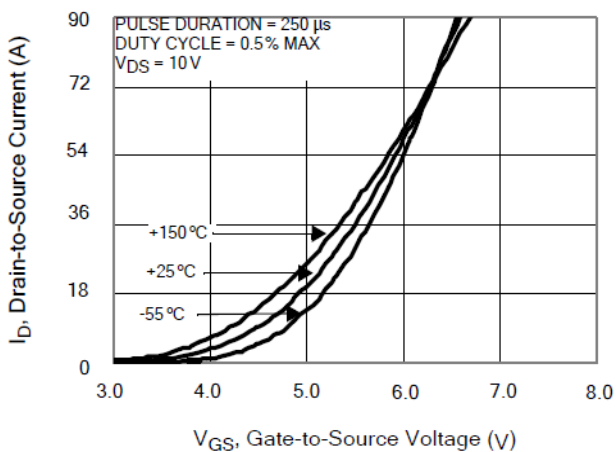


Figure 8. Unclamped Inductive Switching Capability

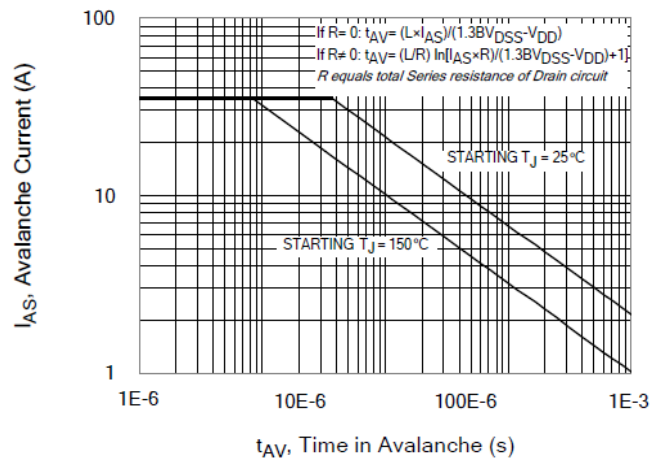


Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current

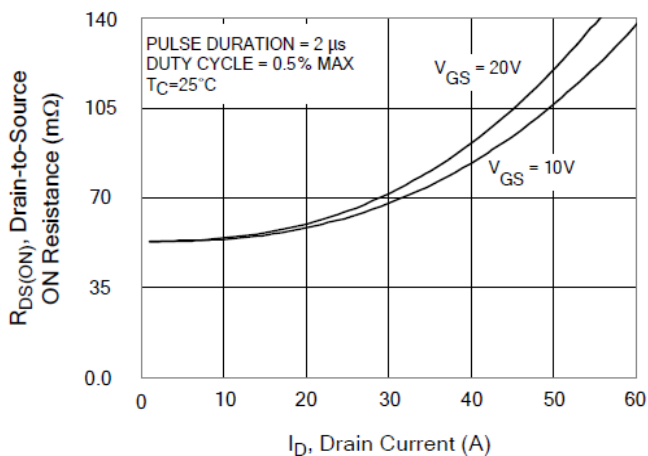
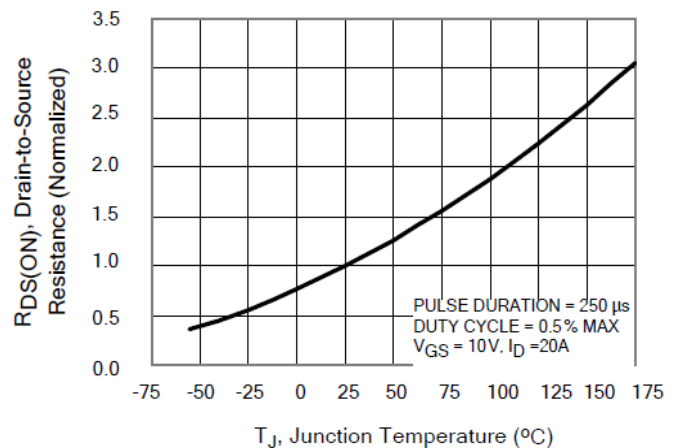


Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature



## Typical Characteristics(Cont.)

Figure 11. Typical Breakdown Voltage vs Junction Temperature

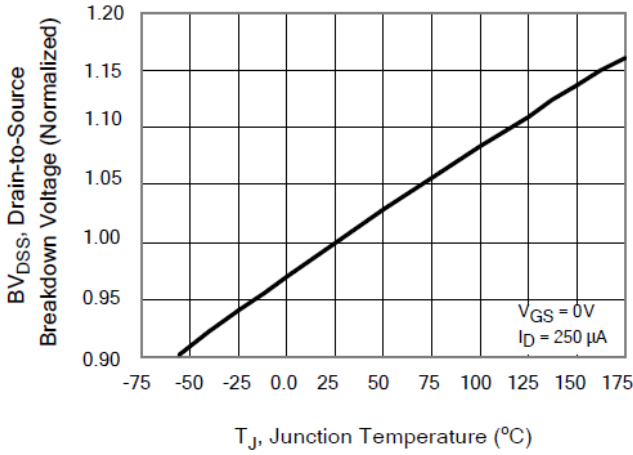


Figure 12. Typical Threshold Voltage vs Junction Temperature

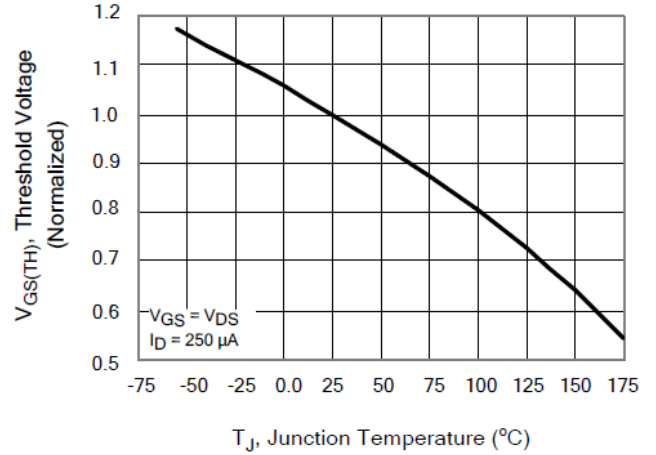


Figure 13. Maximum Forward Bias Safe Operating Area

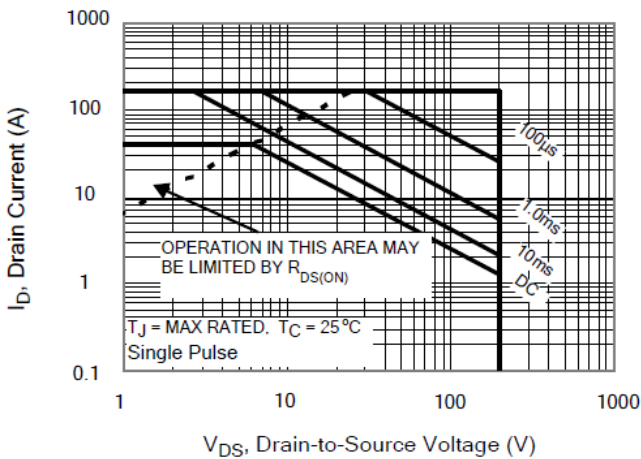


Figure 14. Typical Capacitance vs Drain-to-Source Voltage

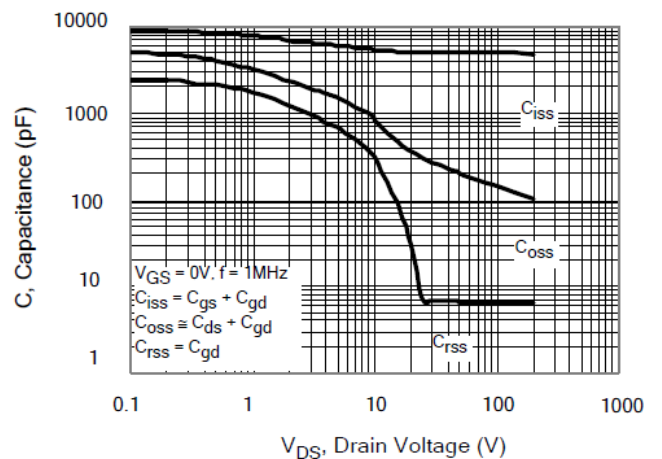


Figure 15. Typical Gate Charge

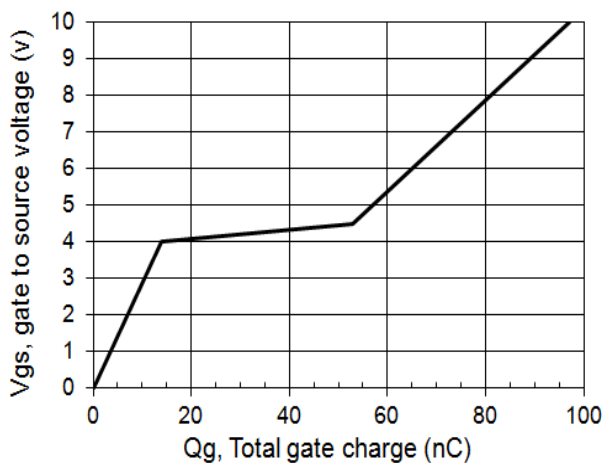
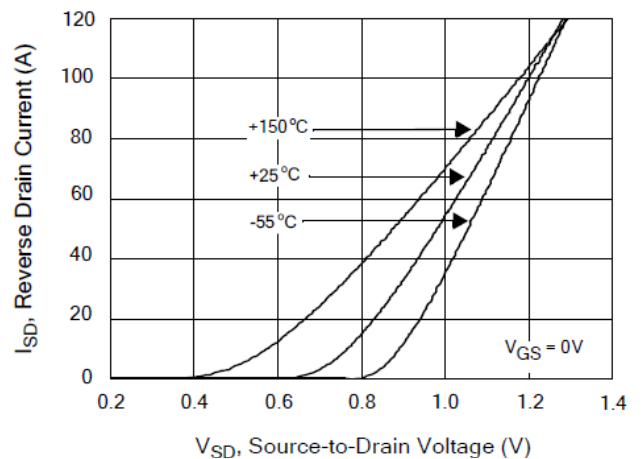


Figure 16. Typical Body Diode Transfer Characteristics



Test Circuits and Waveforms

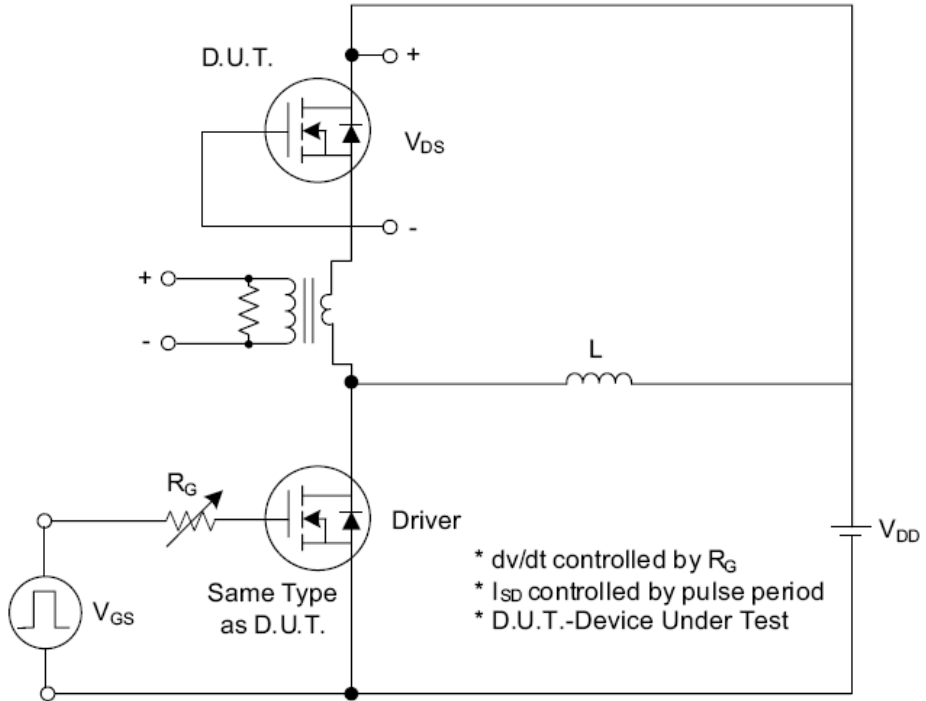


Fig. 1.1 Peak Diode Recovery dv/dt Test Circuit

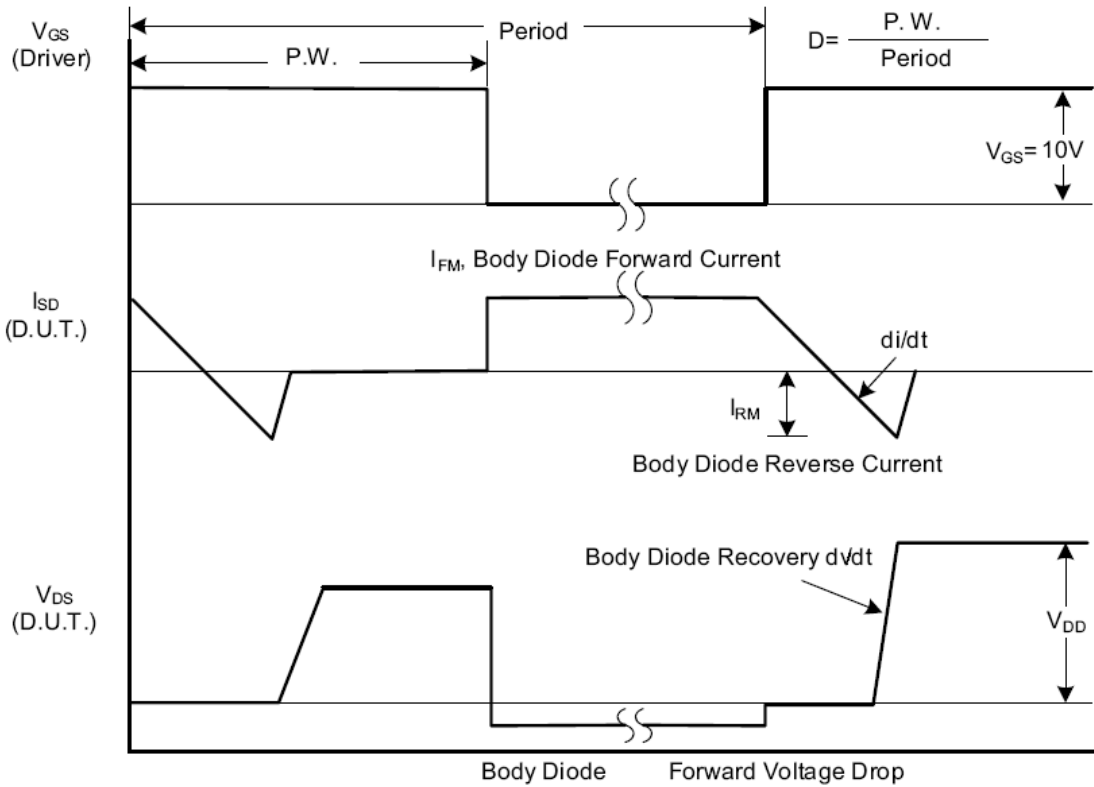


Fig. 1.2 Peak Diode Recovery dv/dt Waveforms

Test Circuits and Waveforms (Cont.)

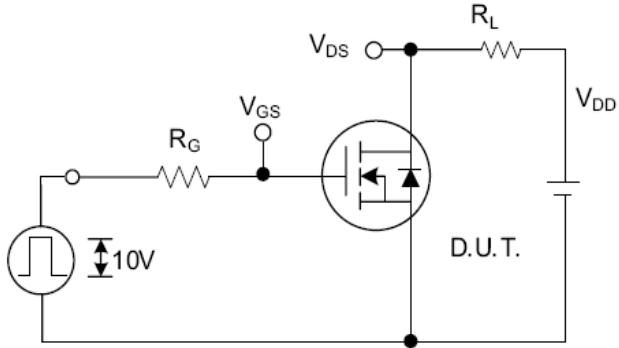


Fig. 2.1 Switching Test Circuit

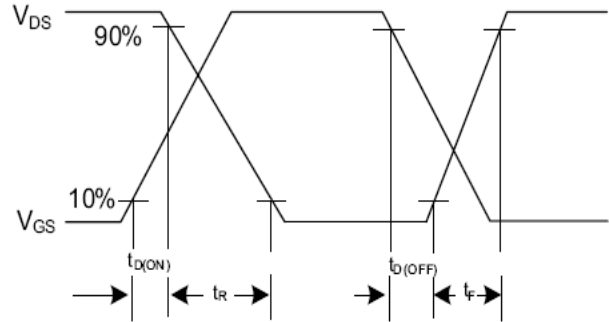


Fig. 2.2 Switching Waveforms

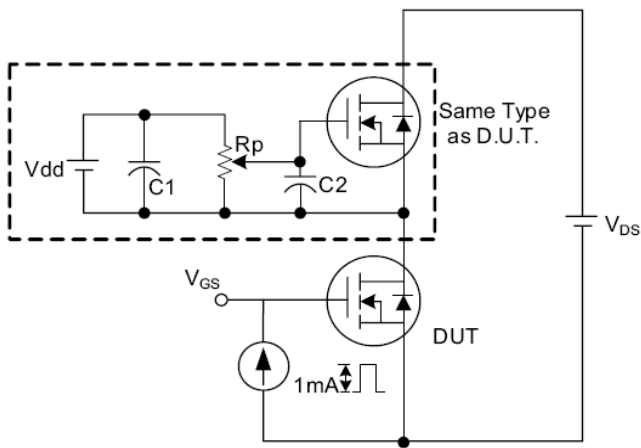


Fig. 3.1 Gate Charge Test Circuit

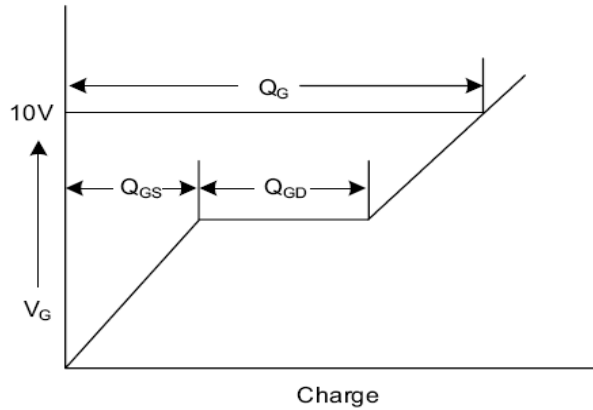


Fig. 3.2 Gate Charge Waveform

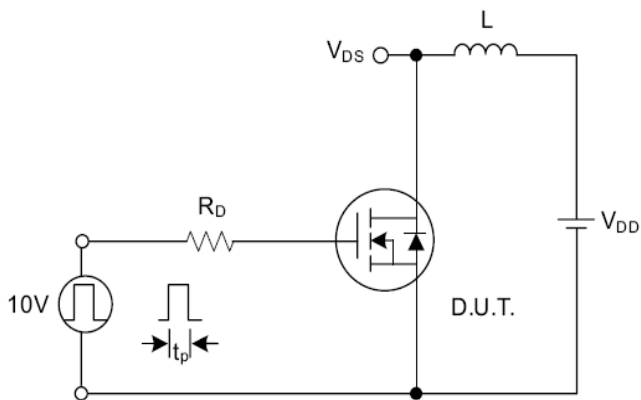


Fig. 4.1 Unclamped Inductive Switching Test Circuit

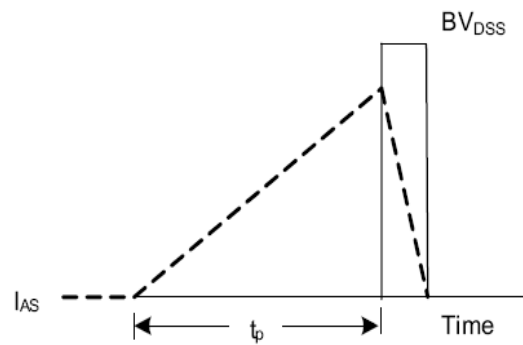
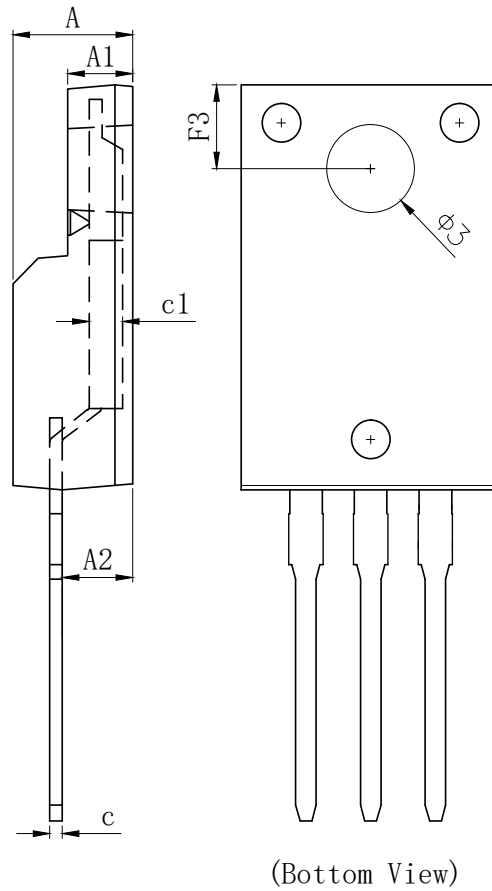
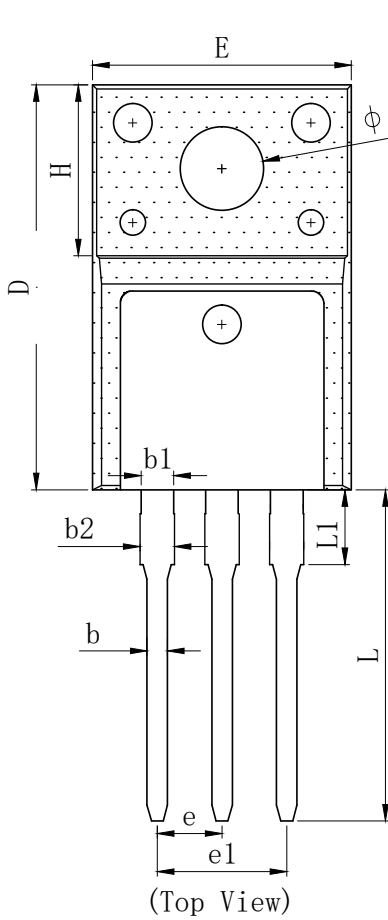
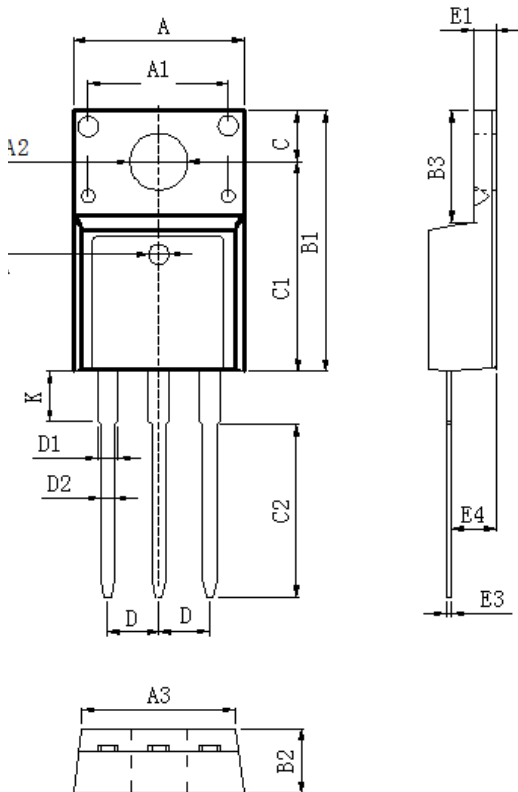


Fig. 4.2 Unclamped Inductive Switching Waveforms

## TO-220F Package Mechanical Data



SYMBOL	MILLIMETER		
	MIN	Typ.	MAX
A	4.500	4.700	4.900
A1	2.340	2.540	2.740
A2	2.560	2.760	2.960
b	0.700	0.800	0.950
b1	1.180	1.280	1.430
b2	1.250	1.350	1.550
c	0.400	0.500	0.650
c1	1.200	1.300	1.350
D	15.570	15.870	16.170
H	6.700 REF		
E	9.960	10.160	10.360
e	2.540 BSC		
e1	5.080 BSC		
L	12.680	12.980	13.280
L1	2.780	2.930	3.080
F3	3.150	3.300	3.450
φ	3.030	3.180	3.450
φ3	3.150	3.450	3.650



DIM	MILLIMETERS
A	10.16 ± 0.3
A1	7.00 ± 0.1
A2	3.3 ± 0.2
A3	9.5 ± 0.2
B1	15.87 ± 0.3
B2	4.7 ± 0.2
B3	6.68 ± 0.4
C	3.3 ± 0.2
C1	12.57 ± 0.3
C2	10.02 ± 0.5
D	2.54 ± 0.05
D1	1.28 ± 0.2
D2	0.8 ± 0.1
K	3.1 ± 0.3
E1	2.54 ± 0.1
E3	0.5 ± 0.1
E4	2.76 ± 0.2
DIA	⊙1.5 (deep 0.2)

Unit :mm




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