

H12N60E

12A N-Channel Power MOSFET

FEATURES

- Fast switching capability
- Avalanche energy specified
- Improved dv/dt capability, high ruggedness

MECHANICAL DATA

Case : Molded plastic body

Terminals : Solder plated, solderable per MIL-STD-750, Method 2026

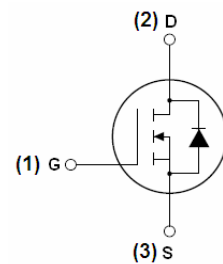
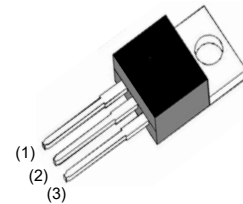
Polarity : As marked

Mounting Position : Any

APPLICATION

- LED power supplies
- Cell Phone Charger
- Standby Power

TO-220AB



Schematic diagram

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	600	V
Gate-Source Voltage		V_{GSS}	± 30	V
Avalanche Current (Note 1)		I_{AR}	12	A
Continuous Drain Current		I_D	12	A
Pulsed Drain Current (Note 1)		I_{DM}	35	A
Avalanche Energy	Single Pulsed (Note 2)	E_{AS}	300	mJ
	Repetitive (Note 1)	E_{AR}	24	mJ
Maximum power dissipation		P_D	150	W
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5	V/ns
Junction Temperature		T_J	+150	
Operating Temperature		T_{OPR}	-55 ~ +150	
Storage Temperature		T_{STG}	-55 ~ +150	

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	600			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$			1	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS} = \pm 30\text{ V}, V_{DS} = 0\text{ V}$			± 100	nA
Breakdown Voltage Temperature Coefficient	BV_{DSS}/T_J	$I_D = 250\text{ }\mu\text{A}$, Referenced to 25°C		0.7		V/
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{V}, I_D = 5.0\text{A}$		0.33	0.37 ⁶	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{MHz}$		1480	1900	pF
Output Capacitance	C_{OSS}			200	270	pF
Reverse Transfer Capacitance	C_{RSS}			25	35	pF
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD} = 300\text{V}, I_D = 12\text{A}, R_G = 25\Omega$ (Note 4, 5)		30	70	ns
Turn-On Rise Time	t_R			115	240	ns
Turn-Off Delay Time	$t_{D(OFF)}$			95	200	ns
Turn-Off Fall Time	t_F			85	180	ns
Total Gate Charge	Q_G	$V_{DS}= 480\text{V}, I_D= 12\text{A}, V_{GS}= 10\text{ V}$ (Note 4, 5)		42	54	nC
Gate-Source Charge	Q_{GS}			8.6		nC
Gate-Drain Charge	Q_{GD}			21		nC
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = 6\text{A}$			1.2	V
Maximum Continuous Drain-Source Diode Forward Current	I_S				12	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				48	A
Reverse Recovery Time	t_{RR}	$V_{GS} = 0\text{ V}, I_S = 12\text{A},$		380		ns
Reverse Recovery Charge	Q_{RR}	$di_F/dt = 100\text{ A}/\mu\text{s}$ (Note 4)		3.5		μC

Notes: 1. Repetitive Rating : Pulse width limited by maximum junction temperature

2. $L = 10\text{ mH}, I_{AS} = 12\text{ A}, V_{DD} = 50\text{ V}, R_G = 25\text{ }\Omega$, Starting $T_J = 25^\circ\text{C}$

3. $I_{SD} \leq 12\text{ A}, di/dt \leq 200\text{ A/s}, V_{DD} \leq BV_{DSS}$ Starting $T_J = 25^\circ\text{C}$

4. Pulse Test : Pulse width $\leq 300\text{ }\mu\text{s}$, Duty cycle $\leq 2\%$

5. Essentially independent of operating temperature.

6. $R_{DS(on)}$ CP test results, typical, is $0.61\text{ }\Omega$ @ $V_{GS} = 10\text{ V}, I_D = 1.0\text{ A}$

TEST CIRCUITS AND WAVEFORMS

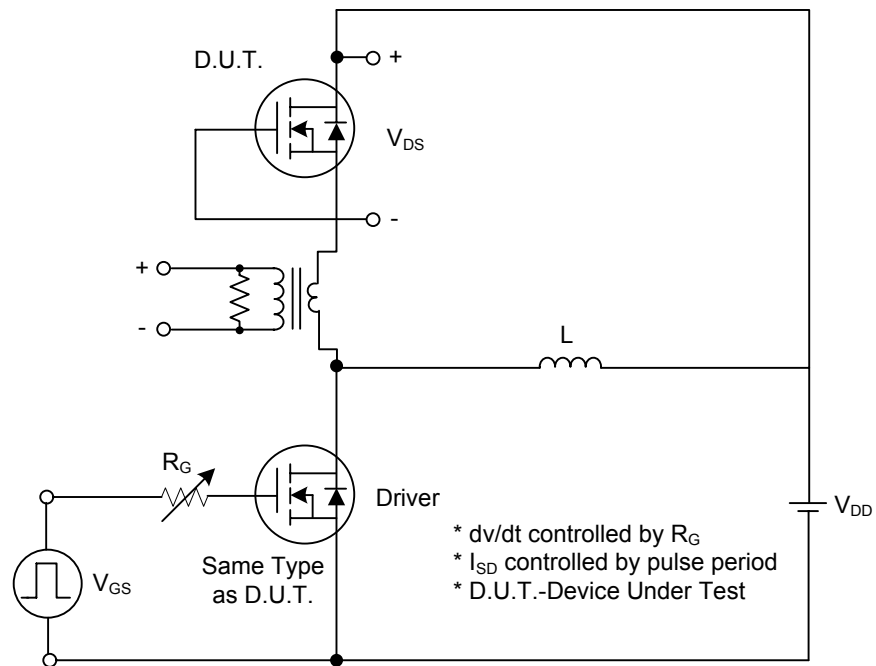


Fig. 1A Peak Diode Recovery dv/dt Test Circuit

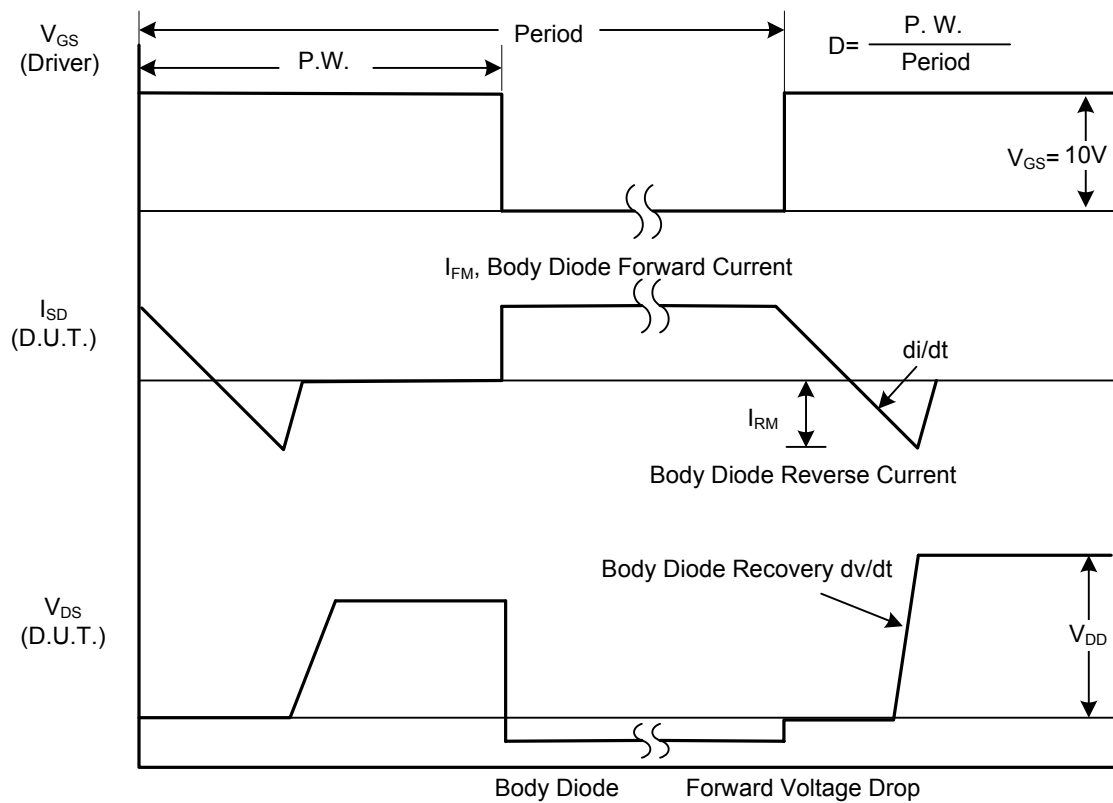


Fig. 1B Peak Diode Recovery dv/dt Waveforms

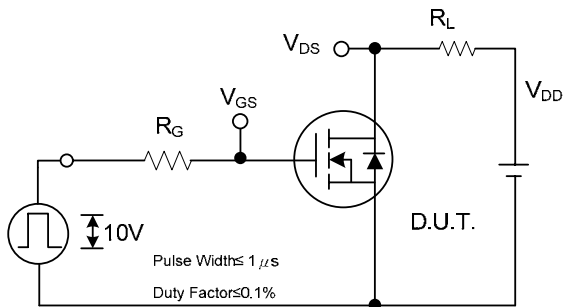


Fig. 2A Switching Test Circuit

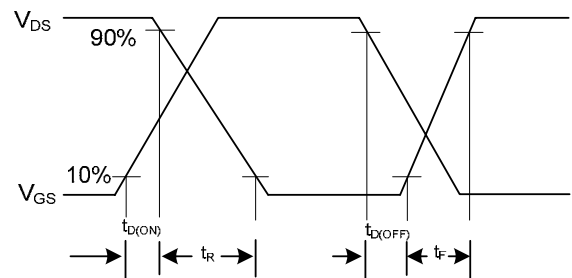


Fig. 2B Switching Waveforms

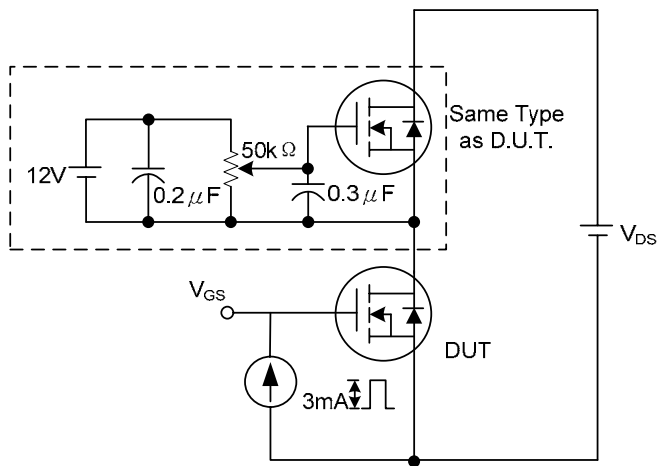


Fig. 3A Gate Charge Test Circuit

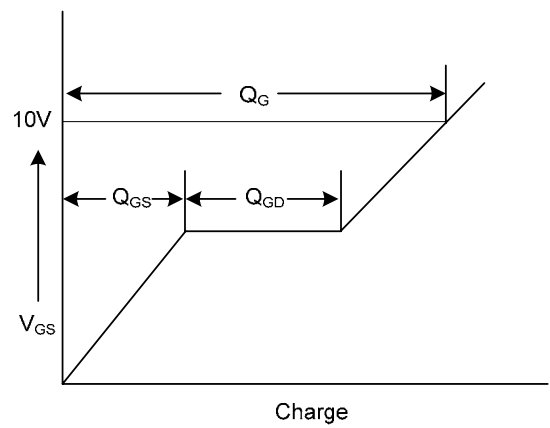


Fig. 3B Gate Charge Waveform

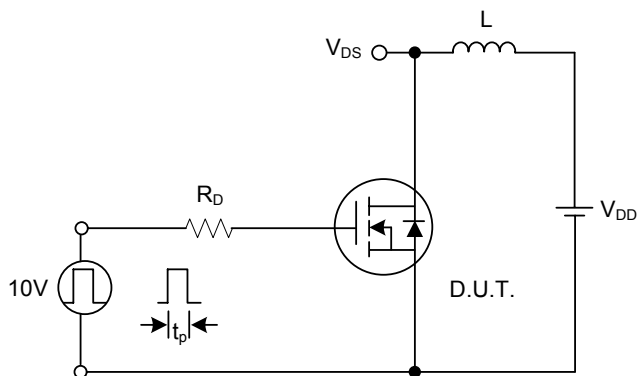


Fig. 4A Unclamped Inductive Switching Test Circuit

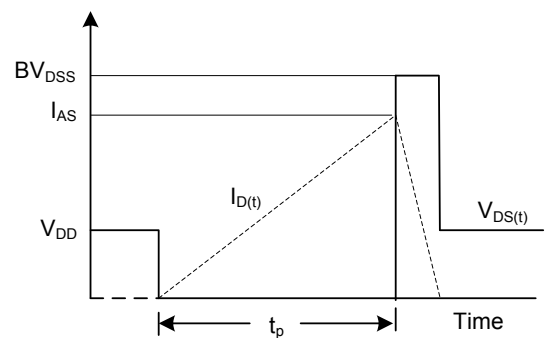
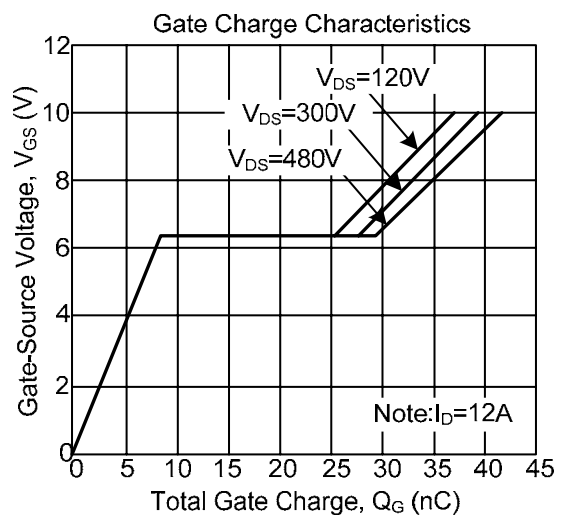
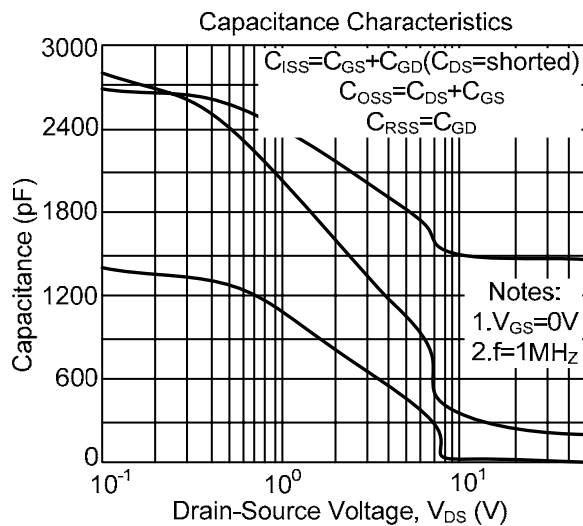
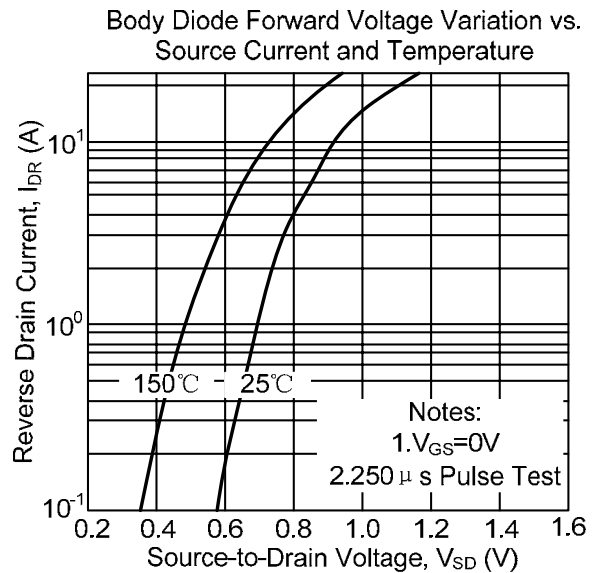
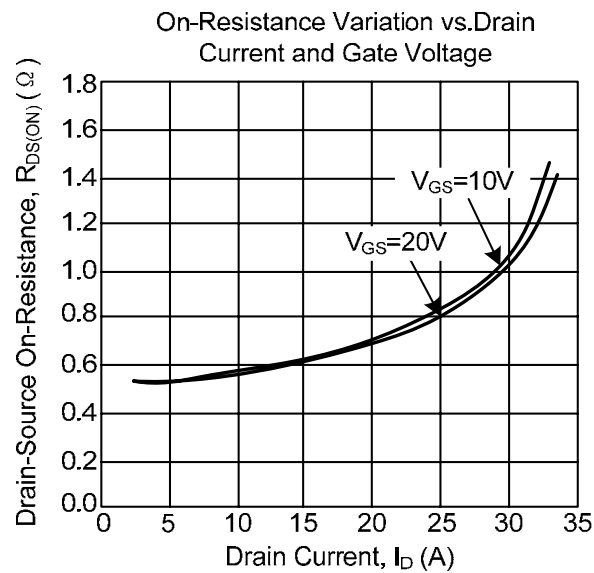
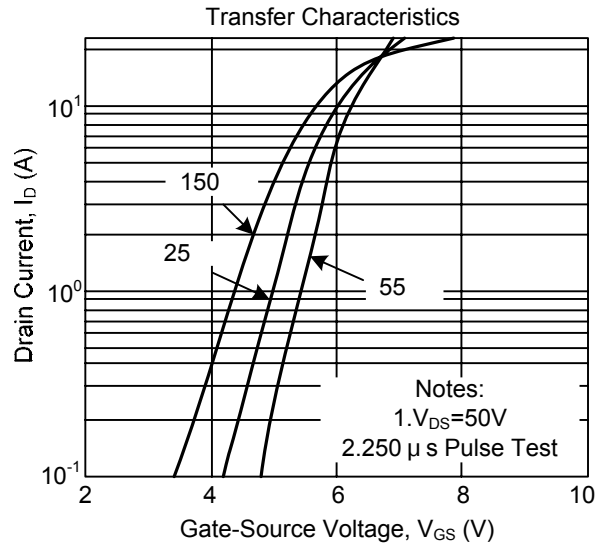
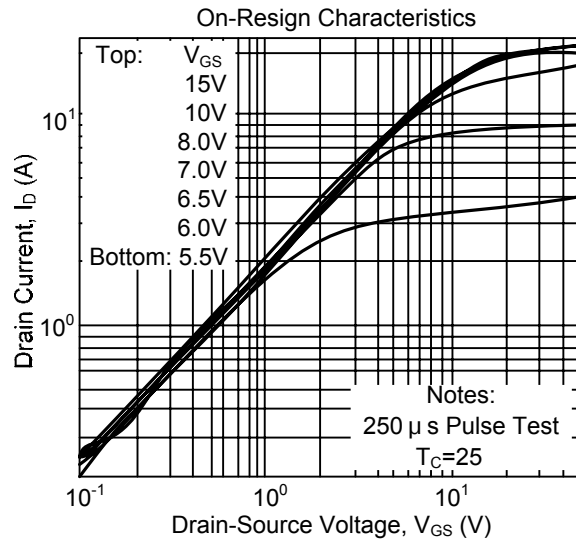
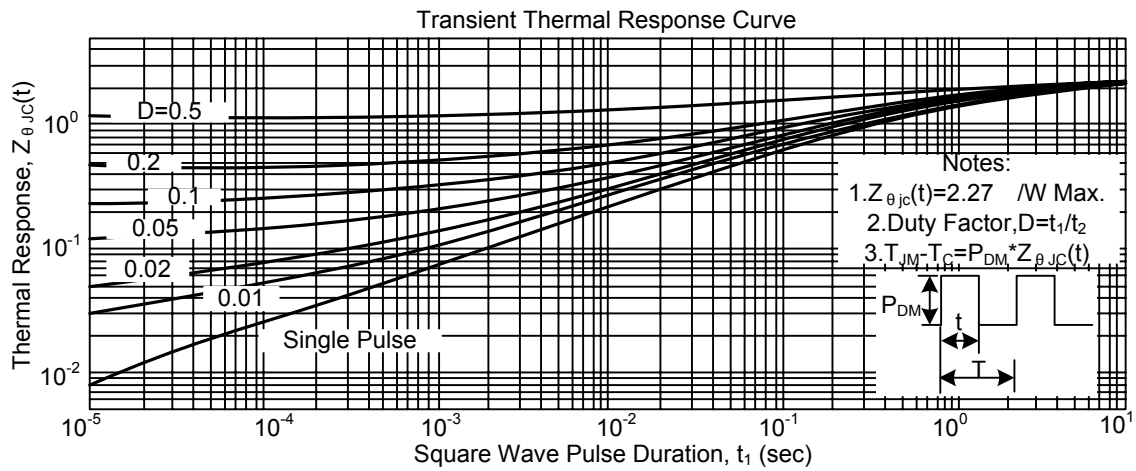
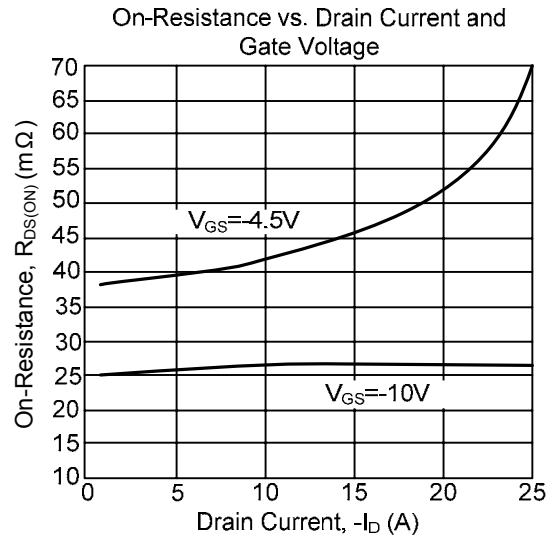
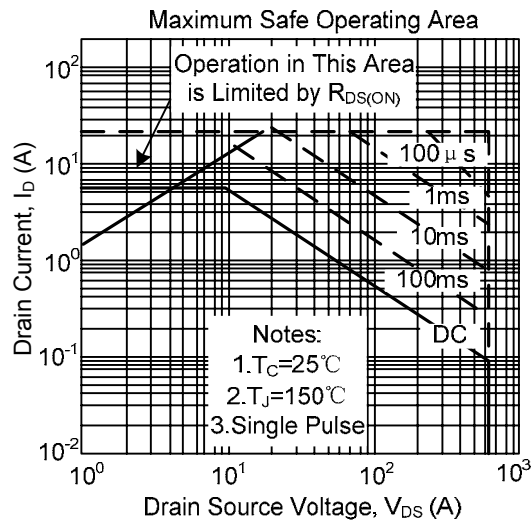


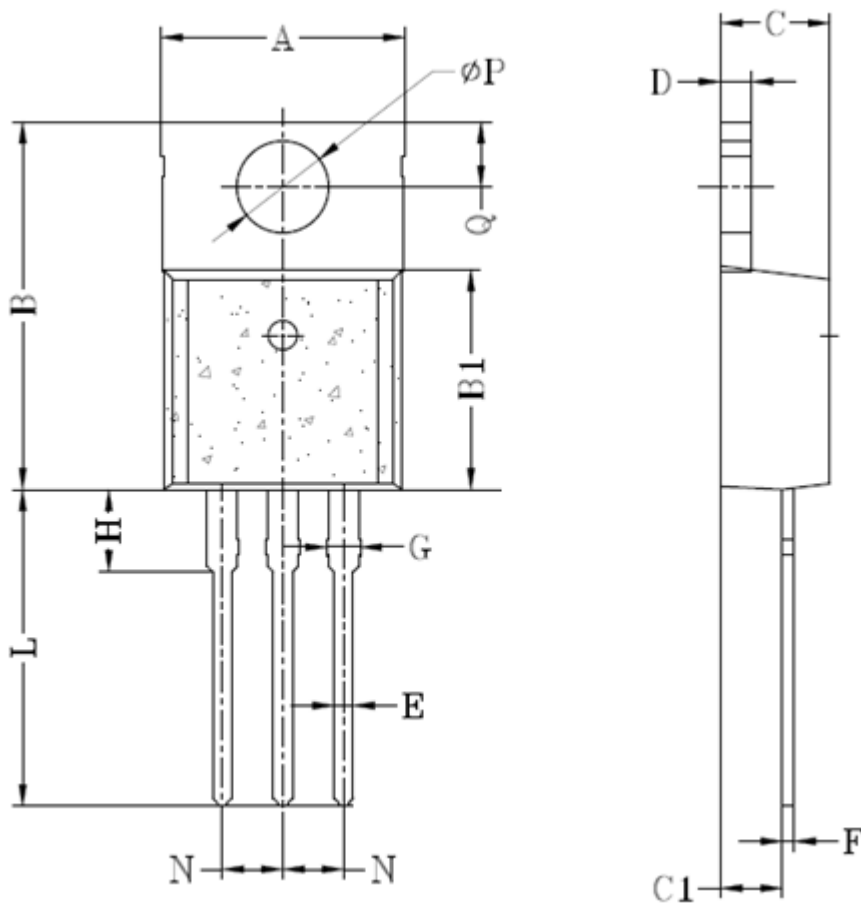
Fig. 4B Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS





Package mechanical data



Symbol	unit(mm)	
	MIN	MAX
A	10.0	10.4
B	15.2	15.6
B1	9.00	9.60
C	4.47	4.67
C1	2.28	2.88
D	1.20	1.40
E	0.70	0.90
F	0.40	0.60
G	1.27	1.47
H	3.20	3.70
L	12.95	13.55
N	2.34	2.74
Q	2.44	3.04
ϕP	3.74	3.94

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