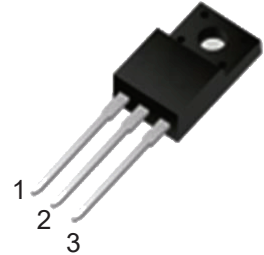
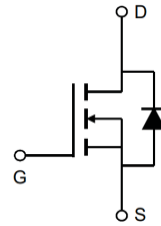


N-Channel Power MOSFET

Features

- Fast Switching
- Low ON Resistance( $R_{dson} \leq 0.85\Omega$ )
- Low Gate Charge (Typical Data:42nC)
- Low Reverse transfer capacitances(Typical:25pF)
- 100% Single Pulse avalanche energy Test
- Halogen Free



- 1. Gate
- 2. Drain
- 3. Source

Applications

Power switch circuit of adaptor and charger.

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

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	$V_{DSS}$	650	V
Gate-Source Voltage	$V_{GSS}$	$\pm 30$	V
Avalanche Current (Note 2)	$I_{AR}$	12	A
Drain Current	Continuous	$I_D$	12
	Pulsed (Note 2)	$I_{DM}$	48
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	790
	Repetitive (Note 2)	$E_{AR}$	24
Peak Diode Recovery dv/dt (Note 4)	dv/dt	4.5	V/ns
Power Dissipation	TO-220 / TO-262	$P_D$	225
	TO-220F / TO-220F1		51
Junction Temperature	$T_J$	+150	$^\circ\text{C}$
Operating Temperature	$T_{OPR}$	-55 ~ +150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55 ~ +150	$^\circ\text{C}$

- Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. Repetitive Rating : Pulse width limited by maximum junction temperature
3.  $L = 10\text{mH}$ ,  $I_{AS} = 12\text{A}$ ,  $V_{DD} = 50\text{V}$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$
4.  $I_{SD} \leq 12\text{A}$ ,  $di/dt \leq 200\text{A/s}$ ,  $V_{DD} \leq BV_{DSS}$  Starting  $T_J = 25^\circ\text{C}$

THERMAL DATA

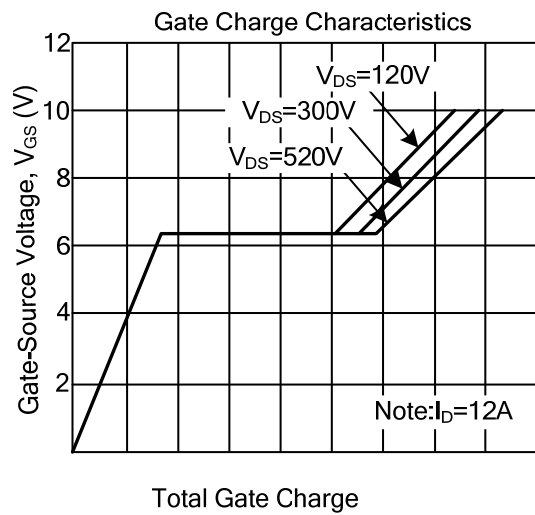
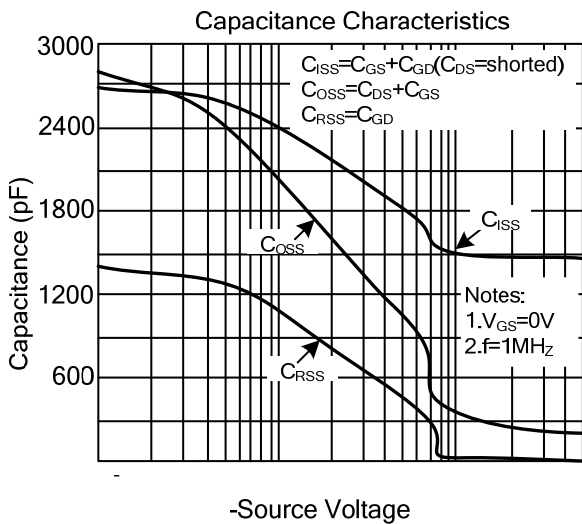
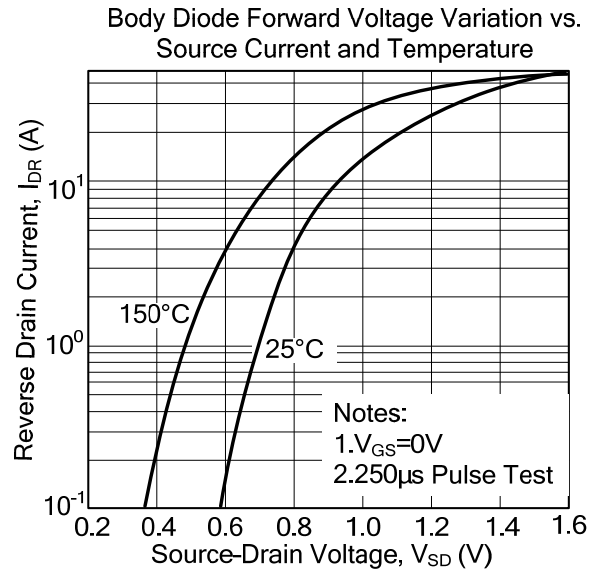
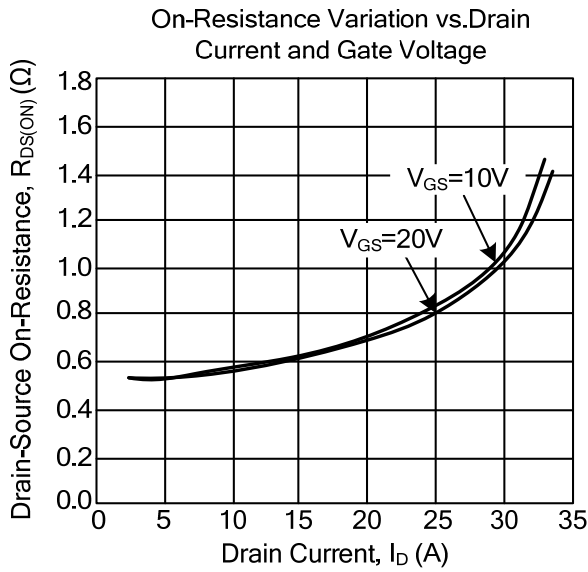
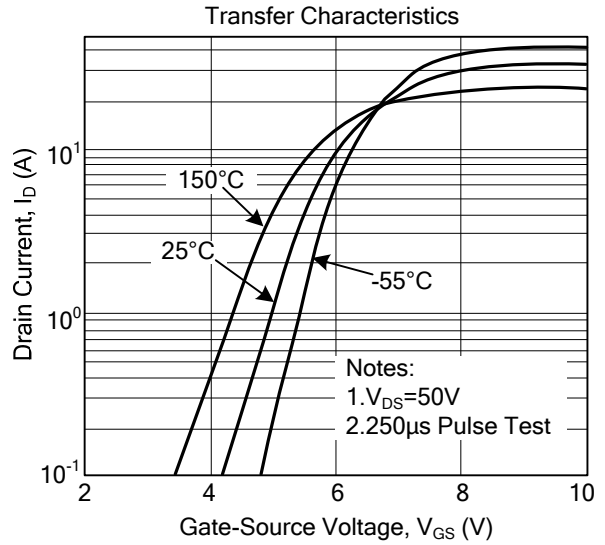
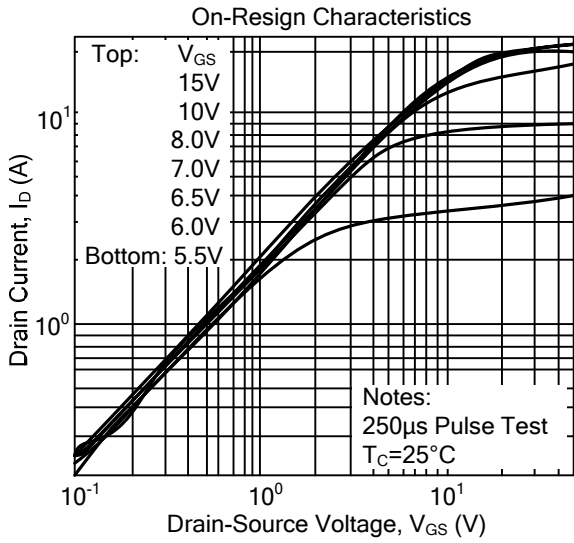
PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	$\theta_{JA}$	62.5	$^\circ\text{C/W}$
Junction to Case	$\theta_{JC}$	0.56	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C, unless otherwise specified)

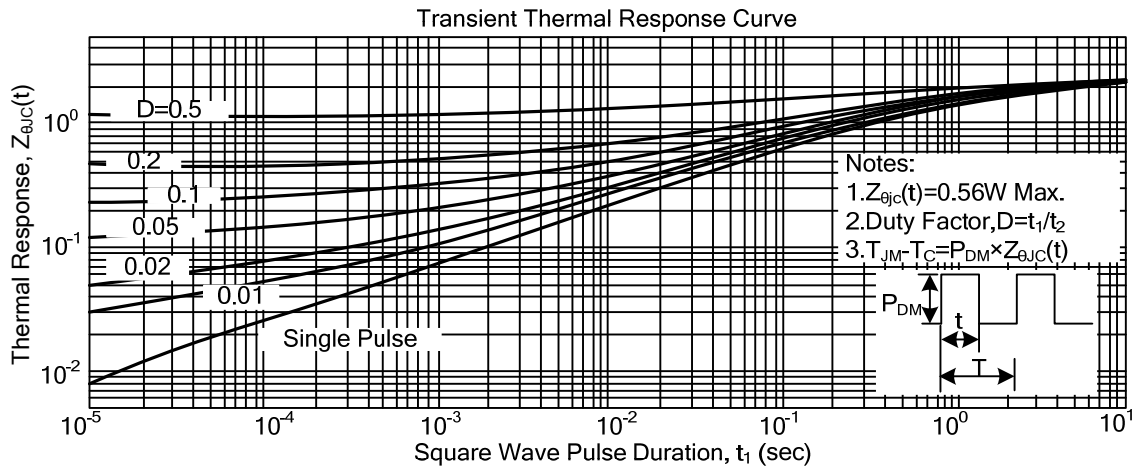
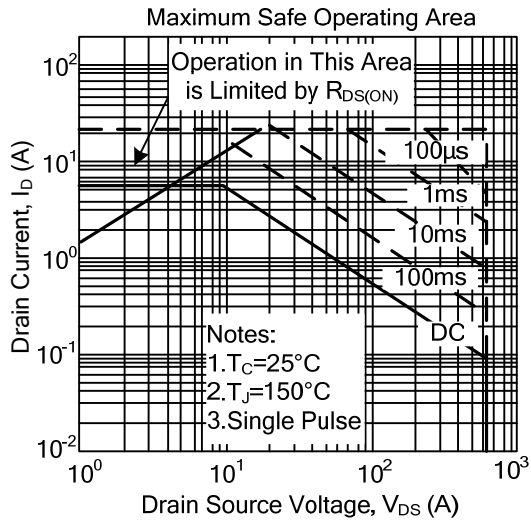
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	650			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = 650 V, V <sub>GS</sub> = 0 V			1	μA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±30 V, V <sub>DS</sub> = 0 V			±100	nA
Breakdown Voltage Temperature Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	I <sub>D</sub> = 250 μA, Referenced to 25°C		0.7		V/°C
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	2.0			V
Static Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 6.0A		0.65	0.85	Ω
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V, f = 1MHz		1480	1900	pF
Output Capacitance	C <sub>OSS</sub>			200	270	pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			25	35	pF
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> = 325V, I <sub>D</sub> = 12A, R <sub>G</sub> = 25Ω (Note 1, 2)		30	70	ns
Turn-On Rise Time	t <sub>R</sub>			115	240	ns
Turn-Off Delay Time	t <sub>D(OFF)</sub>			95	200	ns
Turn-Off Fall Time	t <sub>F</sub>			85	180	ns
Total Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> = 520V, I <sub>D</sub> = 12A, V <sub>GS</sub> = 10 V (Note 1, 2)		42	54	nC
Gate-Source Charge	Q <sub>GS</sub>			8.6		nC
Gate-Drain Charge	Q <sub>GD</sub>			21		nC
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 12A			1.4	V
Maximum Continuous Drain-Source Diode Forward Current	I <sub>S</sub>				12	A
Maximum Pulsed Drain-Source Diode Forward Current	I <sub>SM</sub>				48	A
Reverse Recovery Time	t <sub>RR</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 12A,		380		ns
Reverse Recovery Charge	Q <sub>RR</sub>	dI <sub>F</sub> /dt = 100 A/μs (Note 1)		3.5		μC

Notes: 1. Pulse Test : Pulse width ≤ 300 μs, Duty cycle ≤ 2%  
 2. Essentially independent of operating temperature.

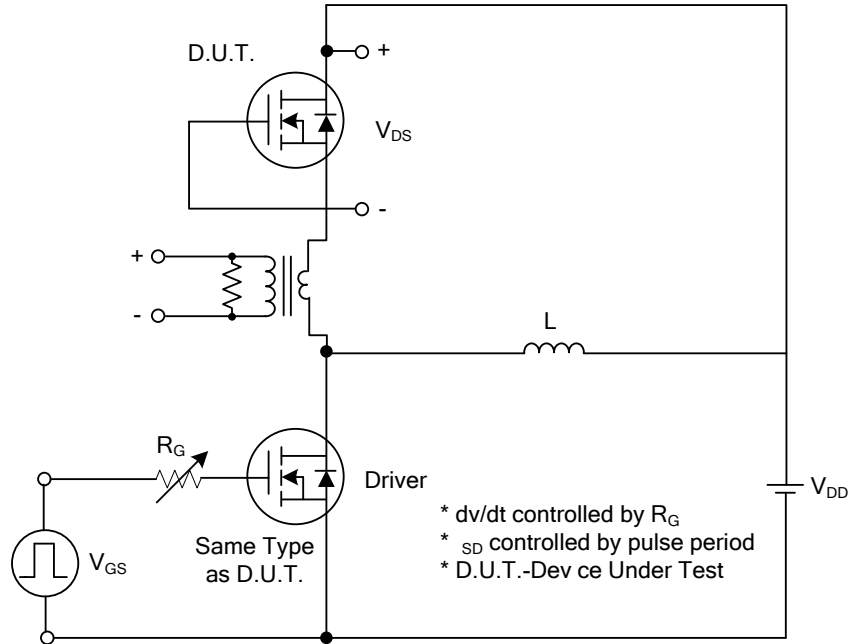
TYPICAL CHARACTERISTICS



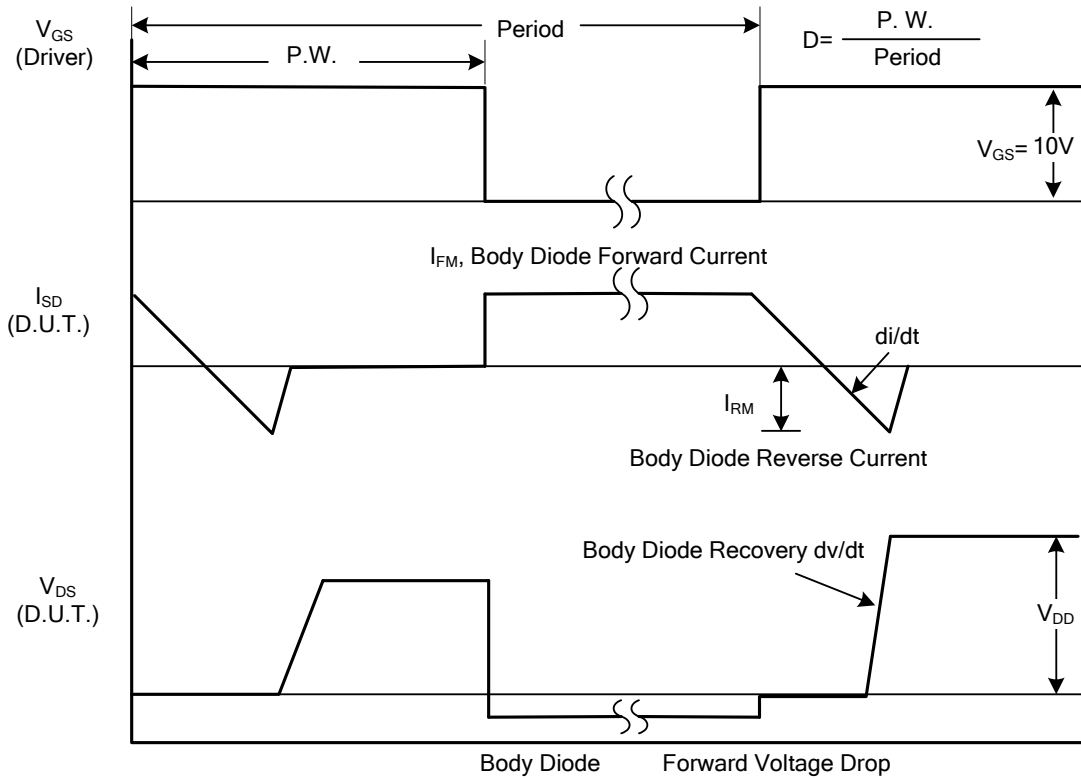
TYPICAL CHARACTERISTICS



TEST CIRCUITS AND WAVEFORMS

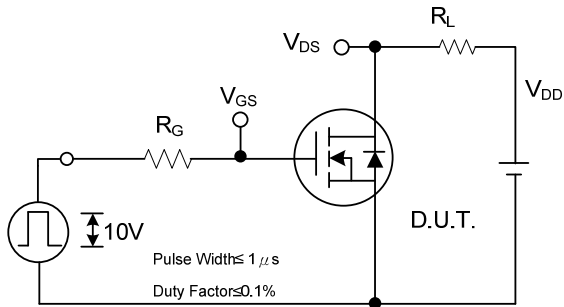


Peak Diode Recovery  $dv/dt$  Test Circuit

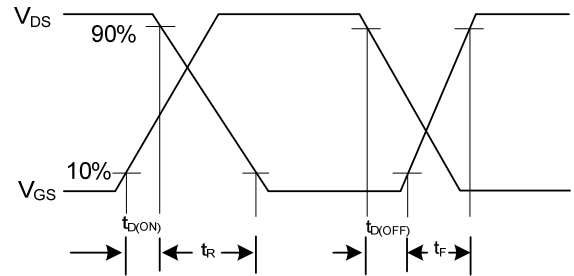


Peak Diode Recovery  $dv/dt$  Waveforms

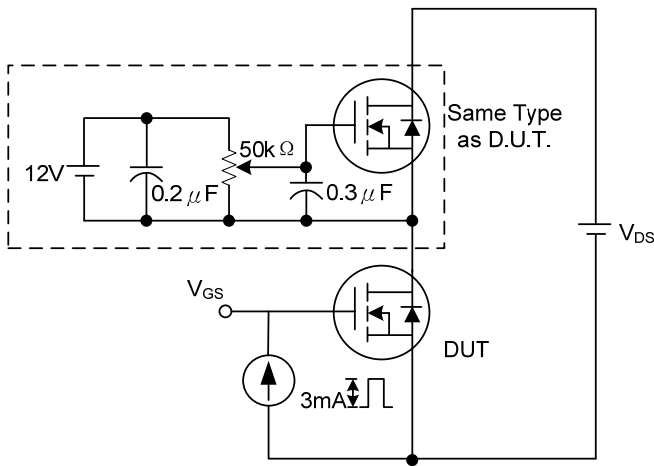
TEST CIRCUITS AND WAVEFORMS (Cont.)



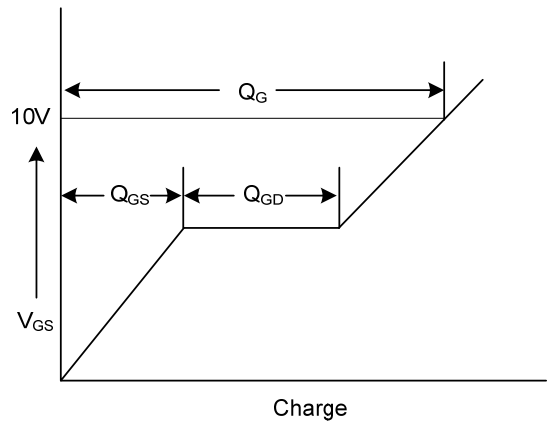
Switching Test Circuit



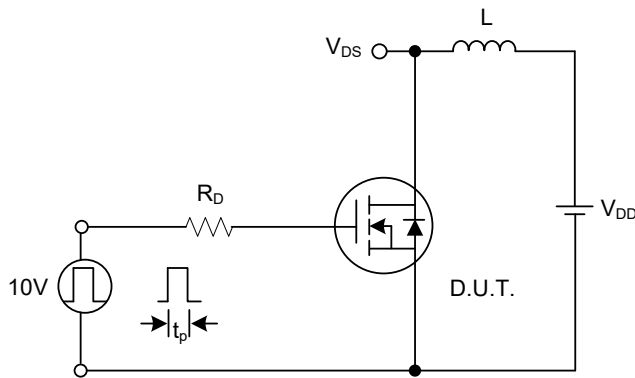
Switching Waveforms



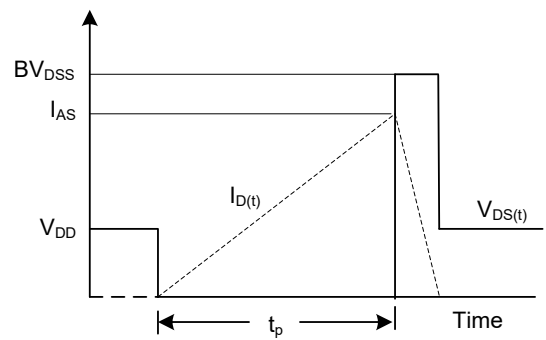
Gate Charge Test Circuit



Gate Charge Waveform

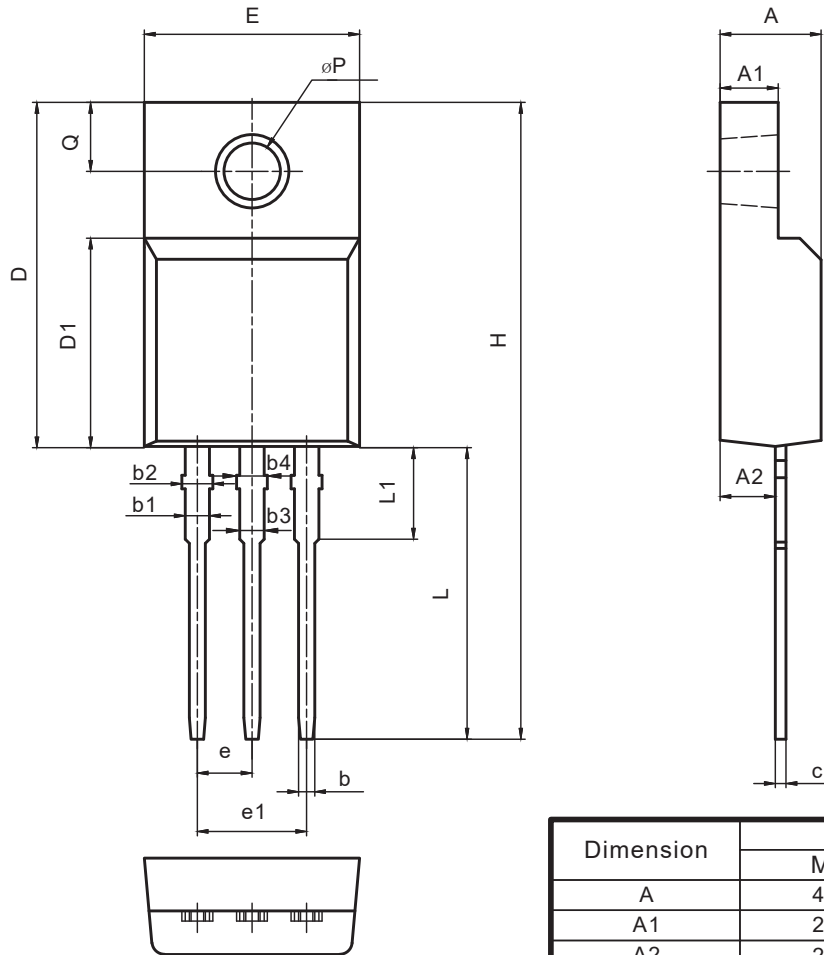


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

### Package Outlines



Dimension	Millimeters	
	Min.	Max.
A	4.50	4.90
A1	2.34	2.85
A2	2.42	2.86
b	0.65	0.90
b1	0.95	1.38
b2	0.95	1.51
b3	0.65	1.38
b4	0.65	1.51
c	0.40	0.63
D	15.67	16.15
D1	8.97	9.83
E	10.00	10.65
e	2.54 (BSC)	
e1	5.08	
H	28.70	29.75
L	12.78	13.75
L1	2.83	3.45
øP	2.95	3.38
Q	3.15	3.50

Figure 1 Outline PG-TO220F, dimensions in mm

### Revision history

Date	Revision	Changes
28-May-2020	1.0	Initial release

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