

Features

- $R_{DS(ON)} < 4.4\Omega @ V_{GS} = 10V, I_D = 1A$
- Fast switching capability
- Lead free in compliance with EU RoHS directive.
- Improved dv/dt capability, high ruggedness

PRODUCT SUMMARY

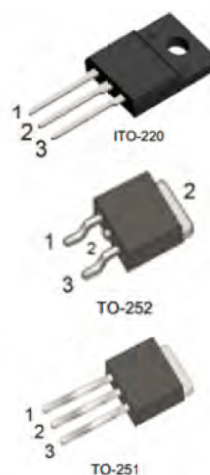
V_{DS} (V)	$R_{DS(on)}$ (Ω)	Current
600	4.4 @ $V_{GS}=10V$	2A

Mechanical Data

- Case: TO-251, TO-252, TO-220F

Ordering Information

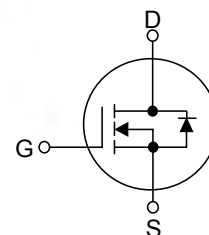
Part No.	Package	Packing
MDP2N60	TO-251	75pcs / Tube
MDT2N60	TO-252	2.5Kpcs / 13" Reel
MPF2N60	TO-220F	50pcs / Tube



Pin Definition:

1. Gate
2. Drain
3. Source

Block Diagram



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	600	V
Gate-Source Voltage		V_{GSS}	± 30	V
Avalanche Current (Note 2)		I_{AR}	2.0	A
Continuous Drain Current		I_D	2.0	A
Pulsed Drain Current (Note 2)		I_{DM}	8.0	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	115	mJ
Power Dissipation	TO-220F	P_D	44	W
	TO-251		34	W
	TO-252		34	W
Junction Temperature		T_J	+150	$^\circ C$
Operating Temperature		T_{OPR}	-55 ~ +150	$^\circ C$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ C$

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. $L = 30mH, I_{AS} = 2.7A, V_{DD} = 50V, R_G = 25 \Omega, \text{Starting } T_J = 25^\circ C$

THERMAL DATA

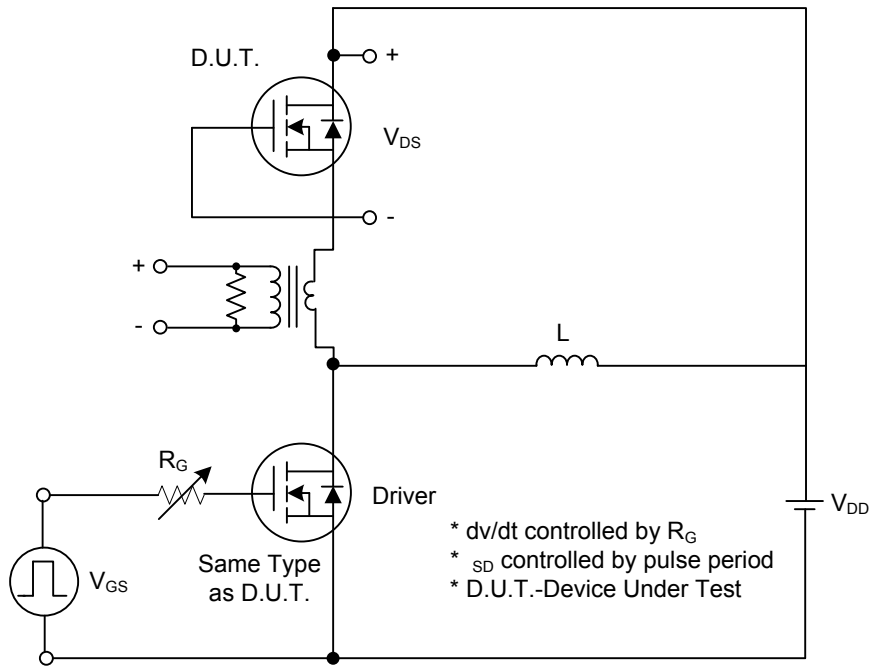
PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220F	θ_{JA}	62.5	°C/W
	TO-251/ TO-252		110	
Junction to Case	TO-220F	θ_{JC}	5.5	°C/W
	TO-252		2.9	
	TO-251		2.9	

ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise specified)

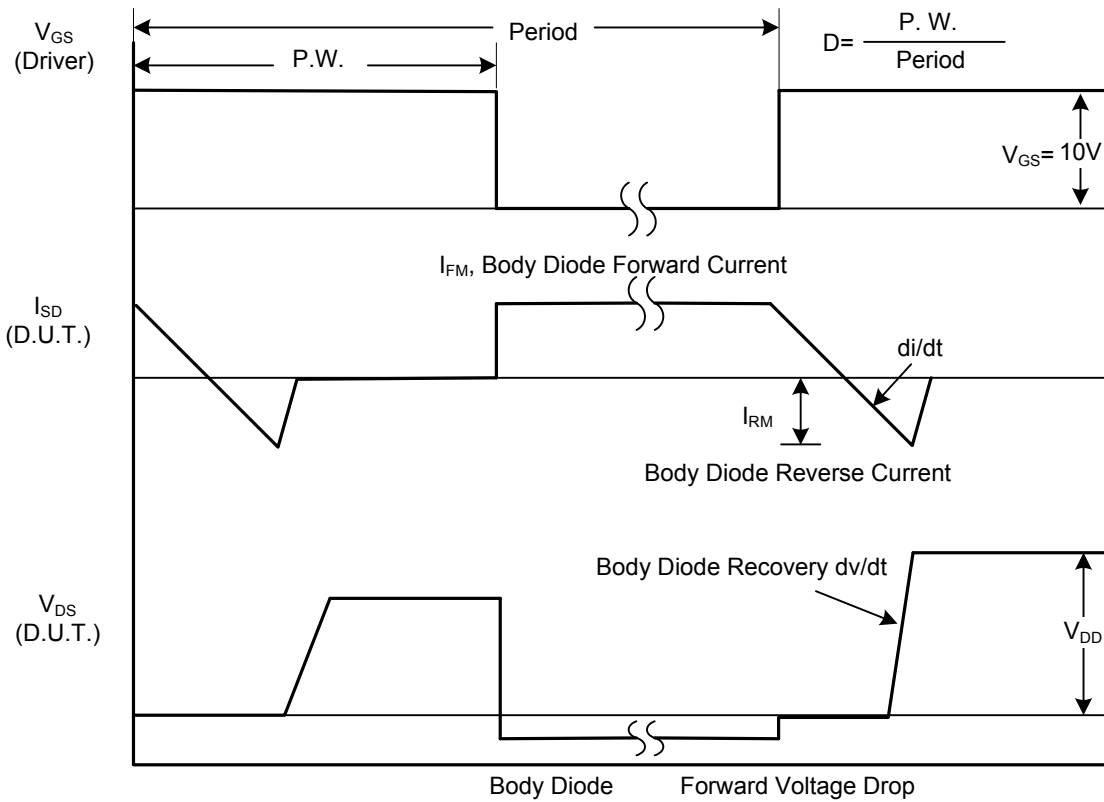
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} = 0V, I _D = 250μA	600			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} = 600V, V _{GS} = 0V			10	μA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{GS} = 30V, V _{DS} = 0V			100	nA
	Reverse		V _{GS} = -30V, V _{DS} = 0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} = V _{GS} , I _D = 250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} = 10V, I _D = 1A		4	4.4	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C _{ISS}	V _{DS} = 25V, V _{GS} = 0V, f = 1MHz		300	-	pF
Output Capacitance		C _{OSS}			45	-	pF
Reverse Transfer Capacitance		C _{RSS}			2	-	pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		t _{D(ON)}	V _{DD} = 300V, I _D = 2A, R _G = 25Ω (Note 1, 2)		10	-	ns
Turn-On Rise Time		t _R			25	-	ns
Turn-Off Delay Time		t _{D(OFF)}			20	-	ns
Turn-Off Fall Time		t _F			25	-	ns
Total Gate Charge		Q _G	V _{DS} = 480V, I _D = 2.4A, V _{GS} = 10V (Note 1, 2)		5.7	-	nC
Gate-Source Charge		Q _{GS}			1.8	-	nC
Gate-Drain Charge		Q _{GD}			2	-	nC
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} = 0V, I _{SD} = 2.0A			1.4	V
Maximum Continuous Drain-Source Diode Forward Current		I _S				2.0	A
Maximum Pulsed Drain-Source Diode Forward Current		I _{SM}				8.0	A
Reverse Recovery Time		t _{rr}	V _{GS} = 0V, I _S = 2A,		357		ns
Reverse Recovery Charge		Q _{RR}	dI _F /dt = 100 A/μs (Note 1)		2		μC

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

TEST CIRCUITS AND WAVEFORMS

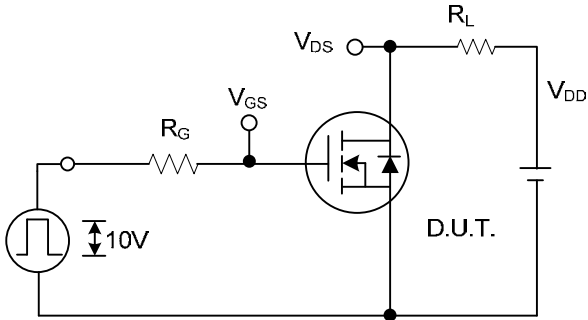


Peak Diode Recovery dv/dt Test Circuit

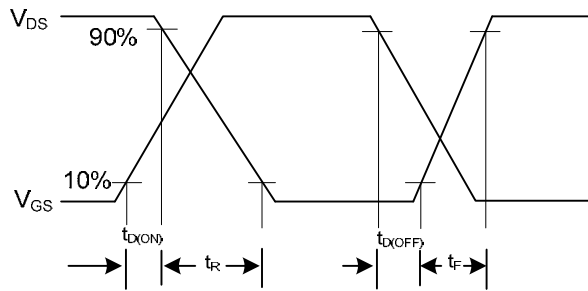


Peak Diode Recovery dv/dt Waveforms

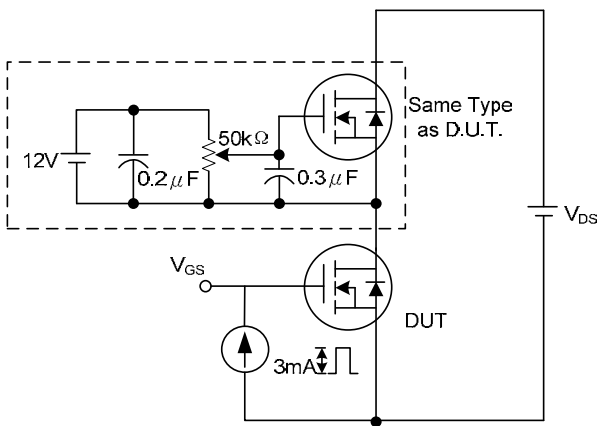
TEST CIRCUITS AND WAVEFORMS(Cont.)



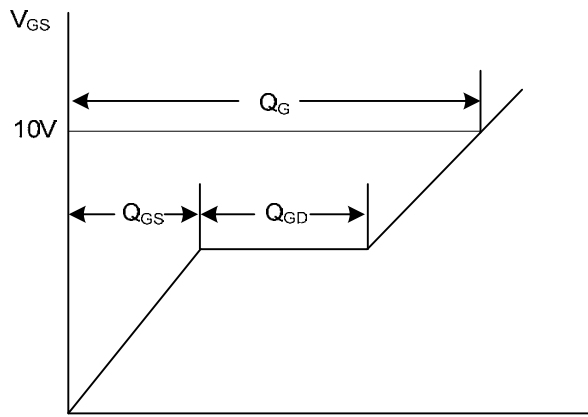
Switching Test Circuit



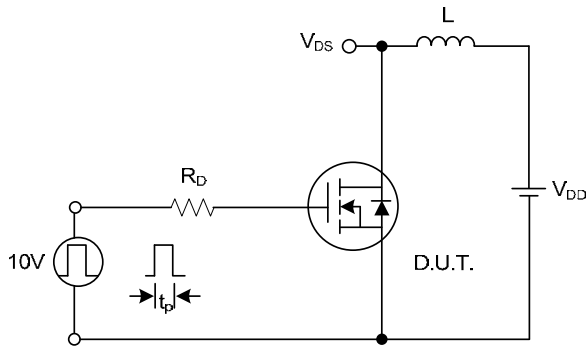
Switching Waveforms



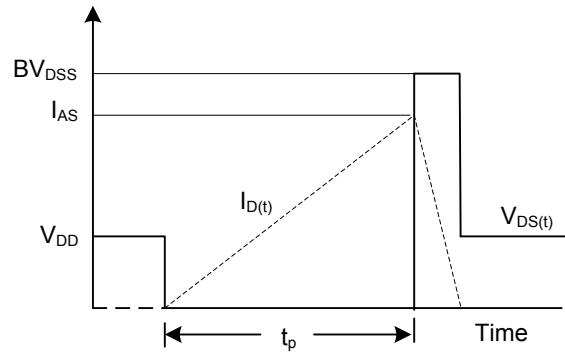
Gate Charge Test Circuit



Charge
Gate Charge Waveform

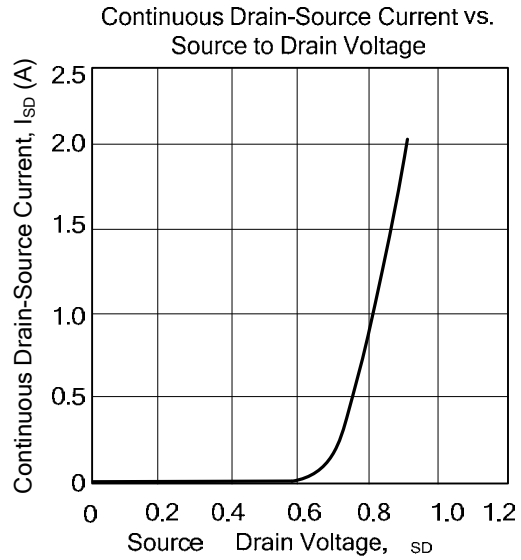
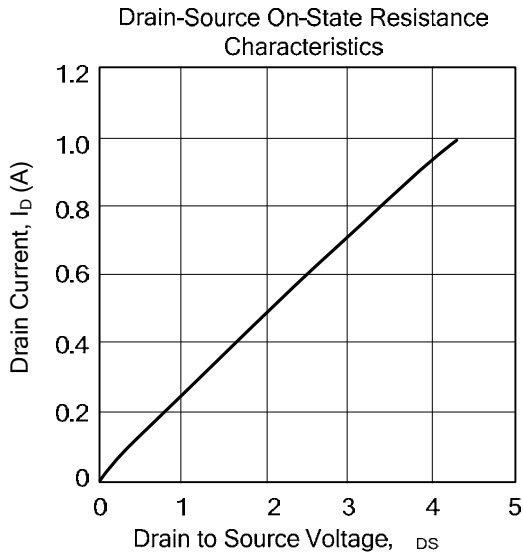
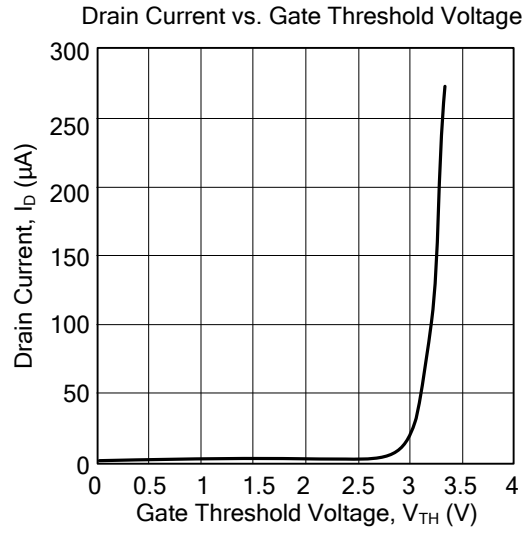
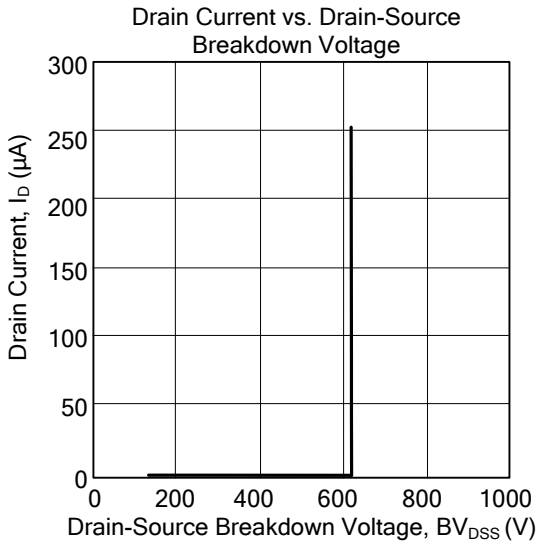


Unclamped Inductive Switching Test Circuit

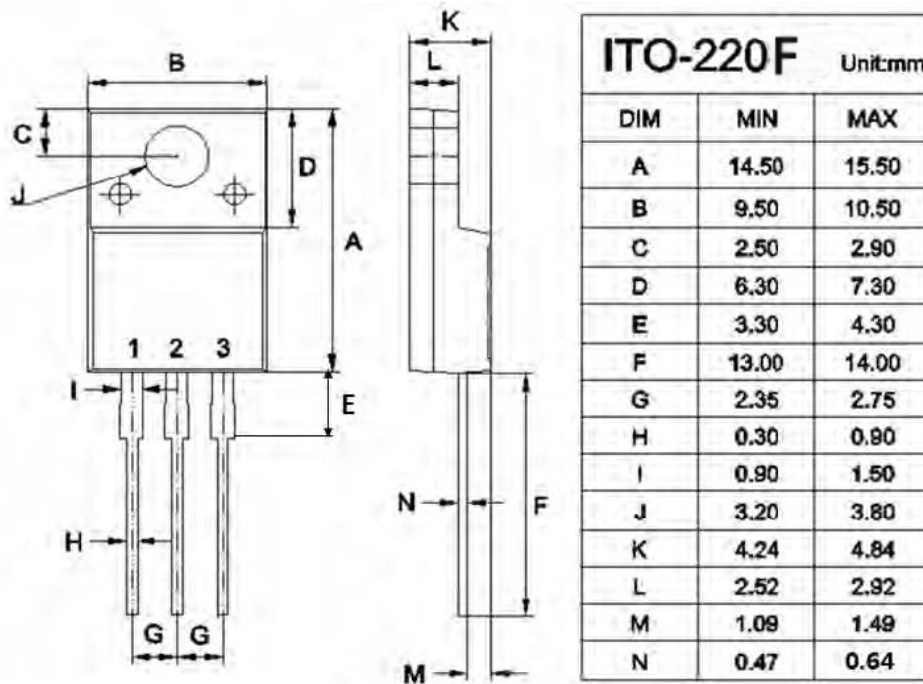


Unclamped Inductive Switching Waveforms

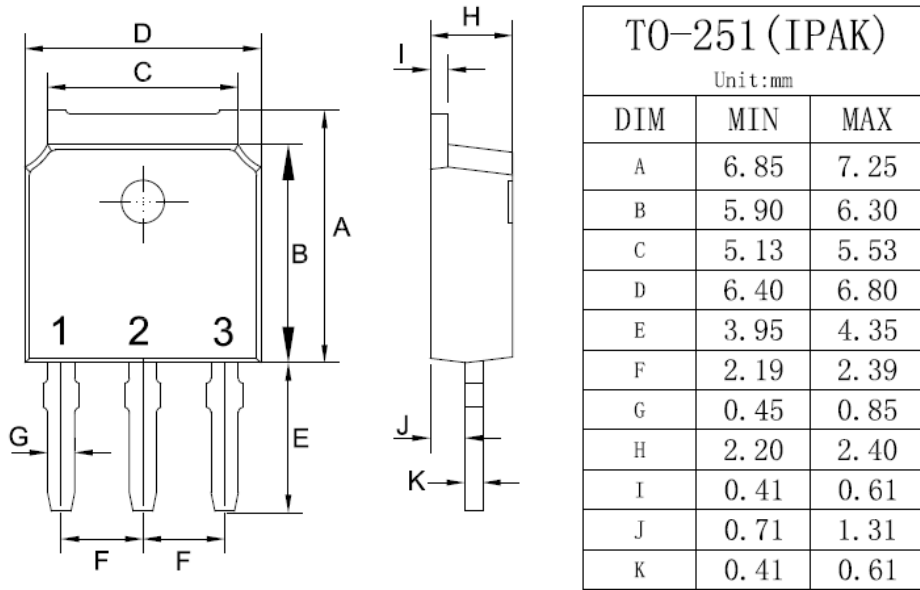
TYPICAL CHARACTERISTICS



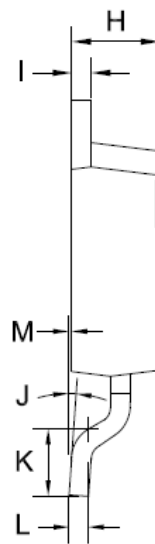
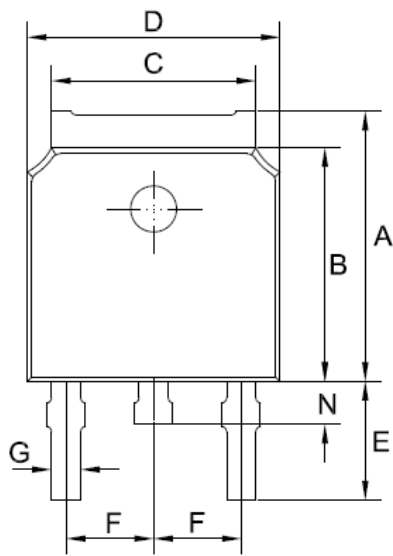
ITO-220F Mechanical Drawing



TO-251 Mechanical Drawing



TO-252 Mechanical Drawing



TO-252 (DPAK)		
Unit:mm		
DIM	MIN	MAX
A	6.85	7.25
B	5.90	6.30
C	5.13	5.53
D	6.40	6.80
E	2.90	3.30
F	2.19	2.39
G	0.45	0.85
H	2.20	2.40
I	0.41	0.61
J	0°	8°
K	1.45	1.85
L	0.41	0.61
M	0.00	0.12
N	0.60	1.00