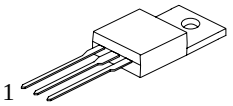
Power MOSFET

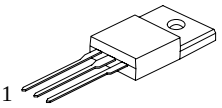
7.0 Amps, 600 Volts
N-CHANNEL MOSFET

P :



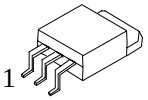
TO-220

F :



TO-220F

DD :



TO-263

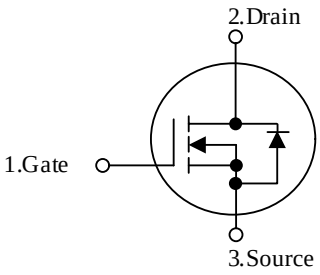
■ DESCRIPTION

The FTK 7N60 is a high voltage MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in switching power supplies and adaptors.

■ FEATURES

* $R_{DS(ON)}$ = 1.2Ω@V_{GS} = 10V
* Low gate and reverse transfer Capacitance (C: 10 pF typical)
* Fast switching capability
* Avalanche energy tested
* Improved dv/dt capability, high ruggedness

■ SYMBOL



■ ORDERING INFORMATION

Order Number	Package	Pin Assignment			Packing
		1	2	3	
FTK7N60P	TO-220	G	D	S	Tube
FTK7N60F	TO-220F	G	D	S	Tube
FTK7N60DD	TO-263	G	D	S	Reel & Taping

Note: Pin Assignment: G: Gate D: Drain S: Source

Power MOSFET

■ ABSOLUTE MAXIMUM RATINGS (T_C = 25˚C, unless otherwise specified)

PARAMET		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	600	V
Gate-Source Voltage		V_{GSS}	±30	V
Avalanche Current (Note 1)		I_{AR}	7.0	A
Continuous Drain Current	T_C = 25°C	I_D	7.0	A
	T_C = 100°C		4.2	
Pulsed Drain Current (Note 1)		I_{DM}	28	A
Avalanche Energy	Single Pulse(Note 2)	E_{AS}	230	mJ
	Repetitive Limited by $T_{J(MAX)}$	E_{AR}	14.7	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5	V/ns
Power Dissipation (TO-220,TO-263/ TO-220F)	T_C = 25°C	P_D	142 / 48	W
	Derate above 25°C		1.14 / 0.38	W / ˚C
Junction Temperature		T_J	+150	˚C
Operating and Storage Temperature		T_{STG}	-55 ~ +150	˚C

Note: 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.

■ THERMAL DATA

PARAMETER		SYMBOL	MIN	TYP	MAX	UNIT
Junction-to-Ambient		θ_{JA}			62.5	˚C / W
Junction-to-Case	TO-220, TO-263	θ_{Jc}			0.88	
	TO-220F	θ_{Jc}			2.6	

■ 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			1	μA
			V_{DS} = 480V, T_C = 125°C			10	μA
Gate-Body Leakage Current	Forward	I_{GSSF}	V_{GS} = 30V, V_{DS} = 0V			100	nA
	Reverse	I_{GSSR}	V_{GS} = -30V, V_{DS} = 0V			-100	nA
Breakdown Voltage Temperature Coefficient		ΔBV_{DSS} / ΔT_J	I_D = 250μA, Referenced to 25°C		0.7		V / ˚C
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS} = V_{GS}, I_D = 250μA	2.0		4.0	V
Static Drain-Source On-Resistance		$R_{DS(ON)}$	V_{GS} = 10V, I_D = 3.5A		1.0	1.2	Ω
Forward Transconductance		g_{FS}	V_{DS} = 50V, I_D = 3.5A (Note 4)		6.4		S
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz		1000		pF
Output Capacitance		C_{OSS}			100		pF
Reverse Transfer Capacitance		C_{RSS}			10		pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		$t_{D(ON)}$	V_{DD} = 300V, I_D = 7A, R_G = 25Ω (Note 4,5)		20		ns
Turn-On Rise Time		t_R			40		ns
Turn-Off Delay Time		$t_{D(OFF)}$			120		ns
Turn-Off Fall Time		t_F			50		ns
Total Gate Charge		Q_G	V_{DS} = 480V,I_D = 7A, V_{GS} = 10V (Note 4,5)		30		nC
Gate-Source Charge		Q_{GS}			5		nC
Gate-Drain Charge		Q_{GD}			10		nC

■ ELECTRICAL CHARACTERISTICS(Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS} = 0 V, I_S = 7.0 A			1.5	V
Maximum Continuous Drain-Source Diode Forward Current	I_S				7.0	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				28	A
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, I_S = 7.0A,		400		ns
Reverse Recovery Charge	Q_{RR}	d_{IF}/dt =100 A/μs (Note 4)		4.0		μC

Note:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 19.5mH, I_{AS} = 7A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C
3. I_{SD} ≤ 7A, di/dt ≤ 300A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

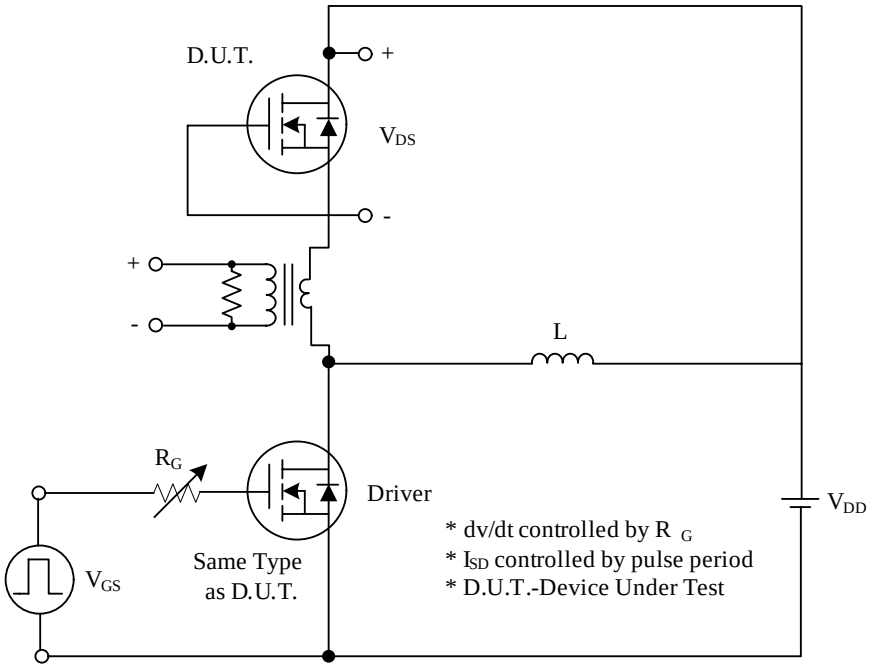


Fig. 1A Peak Diode Recovery dv/dt Test Circuit

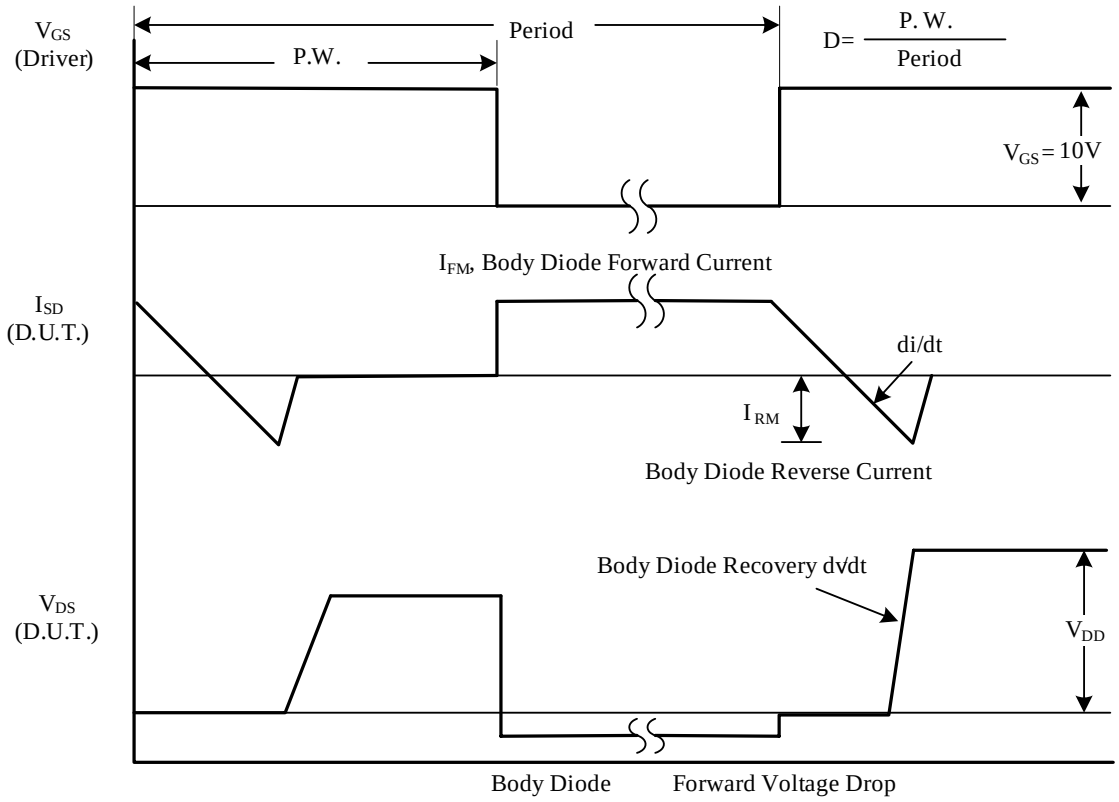


Fig. 1B Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)

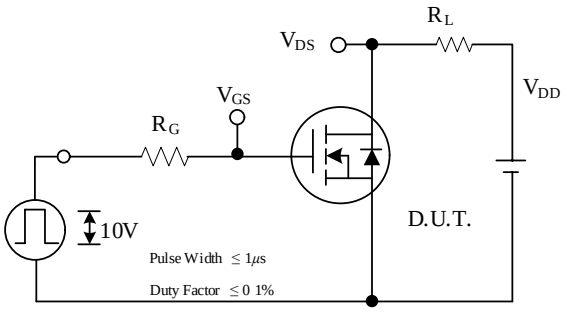


Fig. 2A Switching Test Circuit

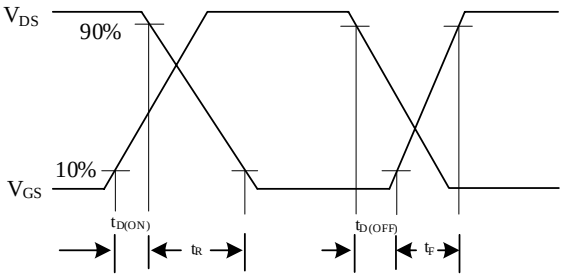


Fig. 2B Switching Waveforms

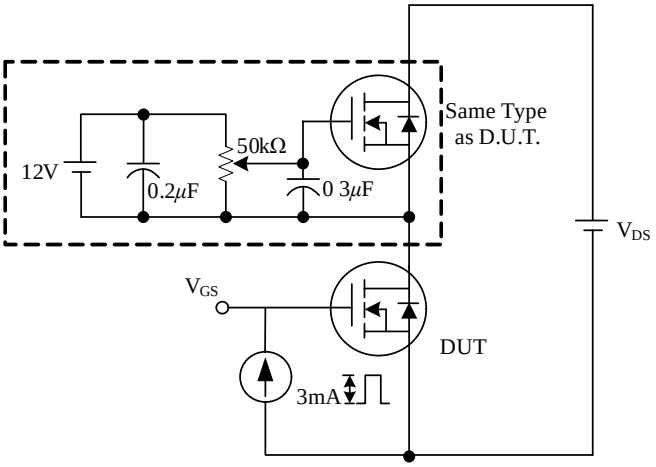


Fig. 3A Gate Charge Test Circuit

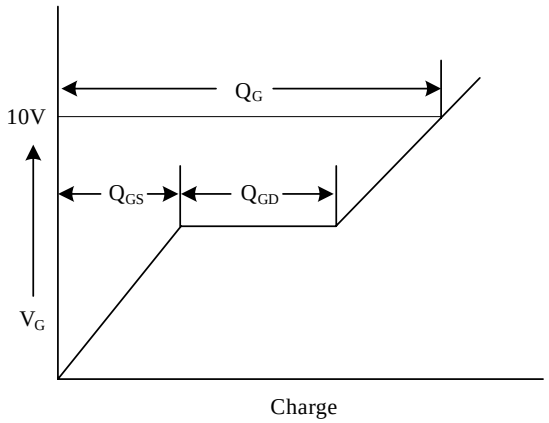


Fig. 3B Gate Charge Waveform

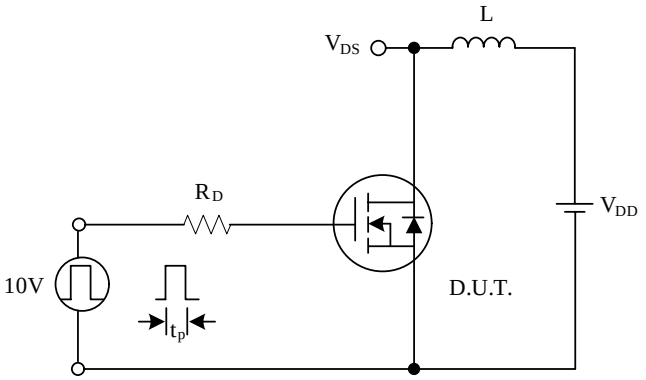


Fig. 4A Unclamped Inductive Switching Test Circuit

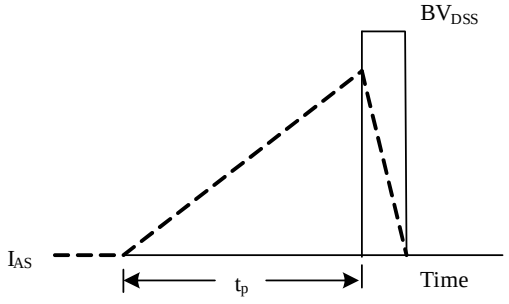
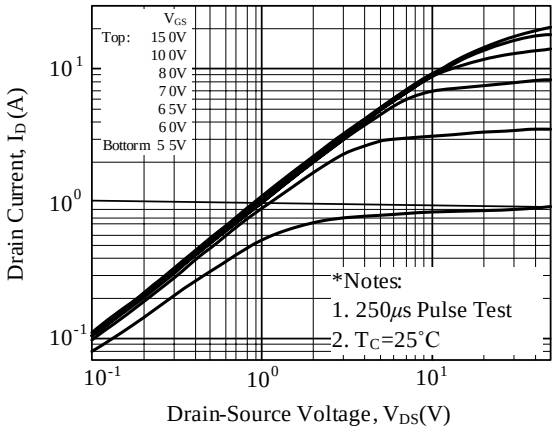
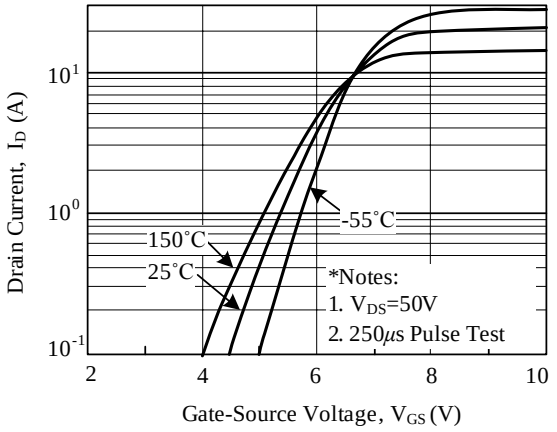


Fig. 4B Unclamped Inductive Switching Waveforms

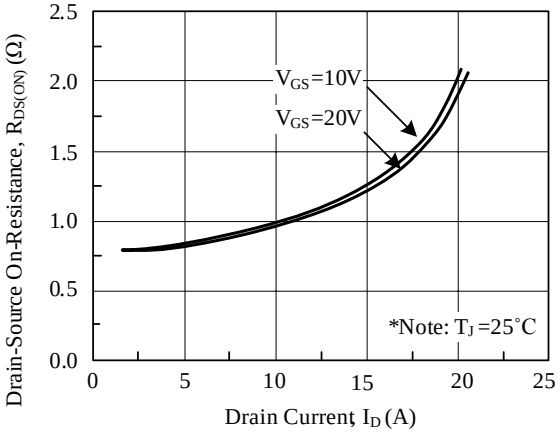
On-Region Characteristics



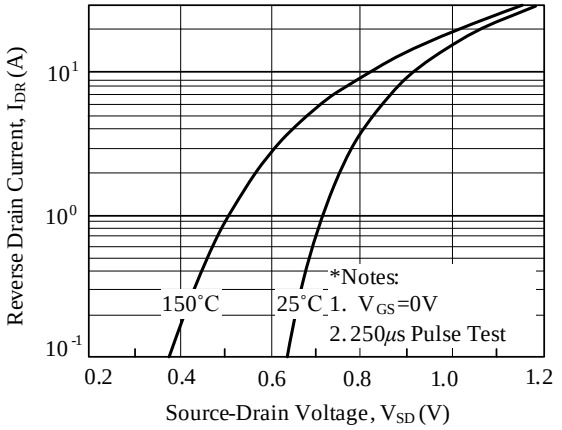
Transfer Characteristics



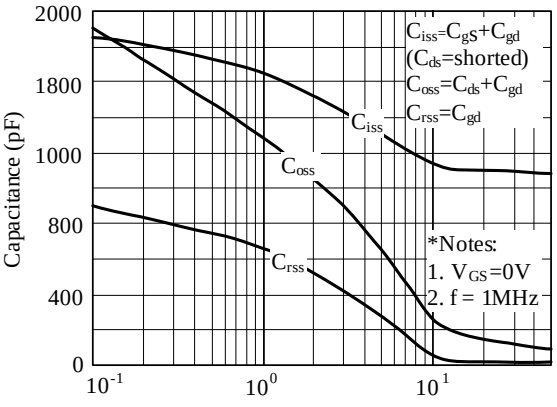
On-Resistance Variation vs Drain Current and Gate Voltage



Body Diode Forward Voltage Variation vs Source Current and Temperature



Capacitance Characteristics



Maximum Safe Operating Area