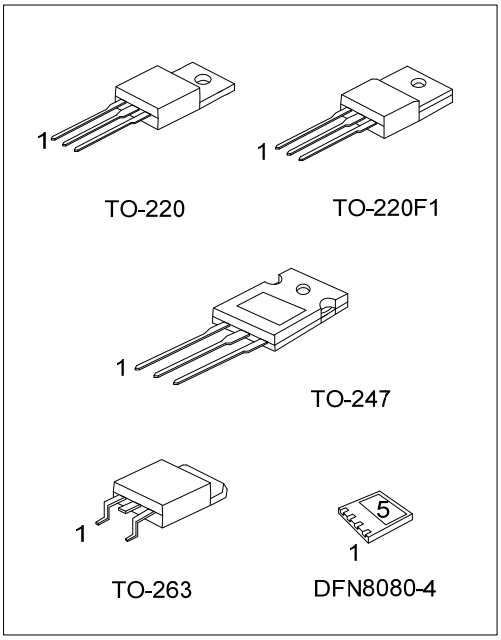
F30NM60

Power MOSFET

30A, 600V N-CHANNEL SUPER-JUNCTION MOSFET



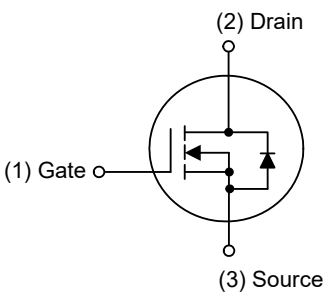
■ DESCRIPTION

The **UTC F30NM60** is a N-Channel enhancement mode silicon gate super junction power MOSFET with fast body diode and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at AC-DC converters for power applications.

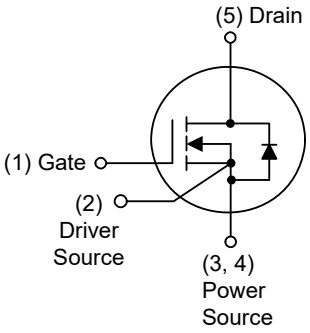
■ FEATURES

* $R_{DS(ON)} \leq 0.13\ \Omega$ @ V_{GS}=10V, I_D=15A
* Fast body diode MOSFET technology
* High Switching Speed
* 100% Avalanche Tested

■ SYMBOL



TO-220 / TO-220F1
TO-247 / TO-263

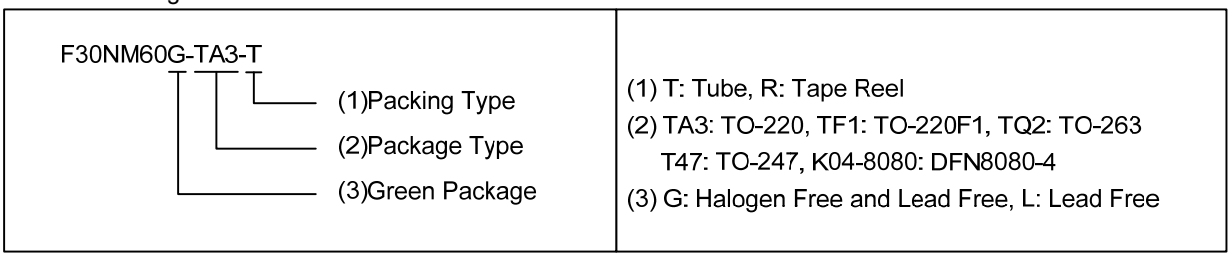


DFN8080-4

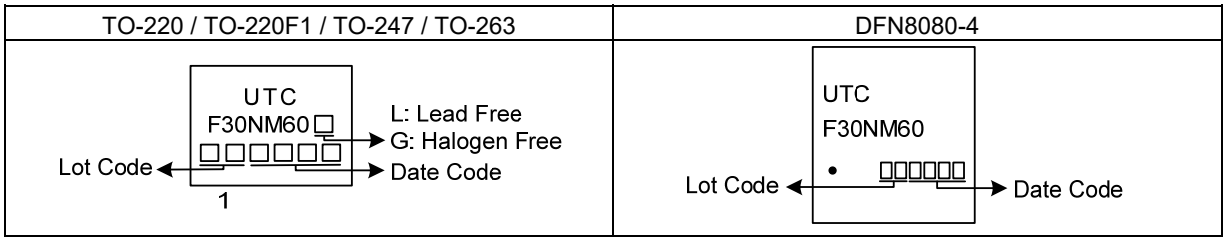
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment					Packing
Lead Free	Halogen Free		1	2	3	4	5	
F30NM60L-TA3-T	F30NM60G-TA3-T	TO-220	G	D	S	-	-	Tube
F30NM60L-TF1-T	F30NM60G-TF1-T	TO-220F1	G	D	S	-	-	Tube
F30NM60L-TQ2-T	F30NM60G-TQ2-T	TO-263	G	D	S	-	-	Tube
F30NM60L-TQ2-R	F30NM60G-TQ2-R	TO-263	G	D	S	-	-	Tape Reel
F30NM60L-T47-T	F30NM60G-T47-T	TO-247	G	D	S	-	-	Tube
F30NM60L-K04-8080-R	F30NM60G-K04-8080-R	DFN8080-4	G	S	S	S	D	Tape Reel

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



■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	600	V
Gate-Source Voltage		V_{GSS}	±30	V
Continuous Drain Current		I_D	30	A
Pulsed Drain Current (Note 2)		I_{DM}	60	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	264	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	11	V/ns
Power Dissipation	TO-220/TO-263	P_D	128	W
	TO-220F1		40	W
	TO-247		145	W
	DFN8080-4		70	W
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-55 ~ +150	°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 = 100mH, I_{AS} = 2.3A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C
4. I_{SD} ≤ 30A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F1 TO-263	θ_{JA}	62.5	°C/W
	TO-247		40	°C/W
	DFN8080-4		35 (Note)	°C/W
Junction to Case	TO-220/TO-263	θ_{JC}	0.97	°C/W
	TO-220F1		3.125	°C/W
	TO-247		0.86	°C/W
	DFN8080-4		1.78 (Note)	°C/W

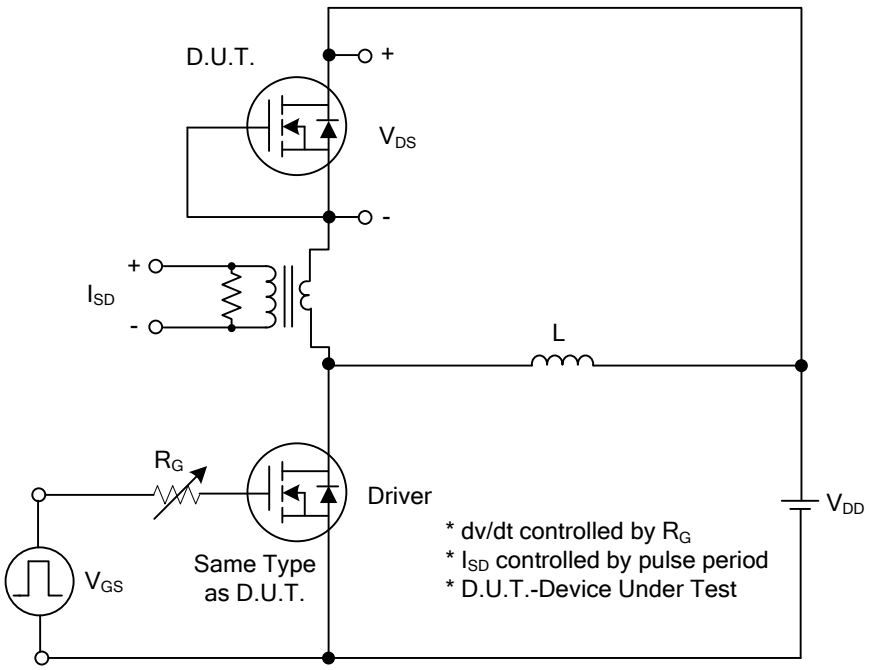
Note: Surface mounted on 1 in^2 copper pad of FR4 board; 270°C/W when mounted on min. copper pad.

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

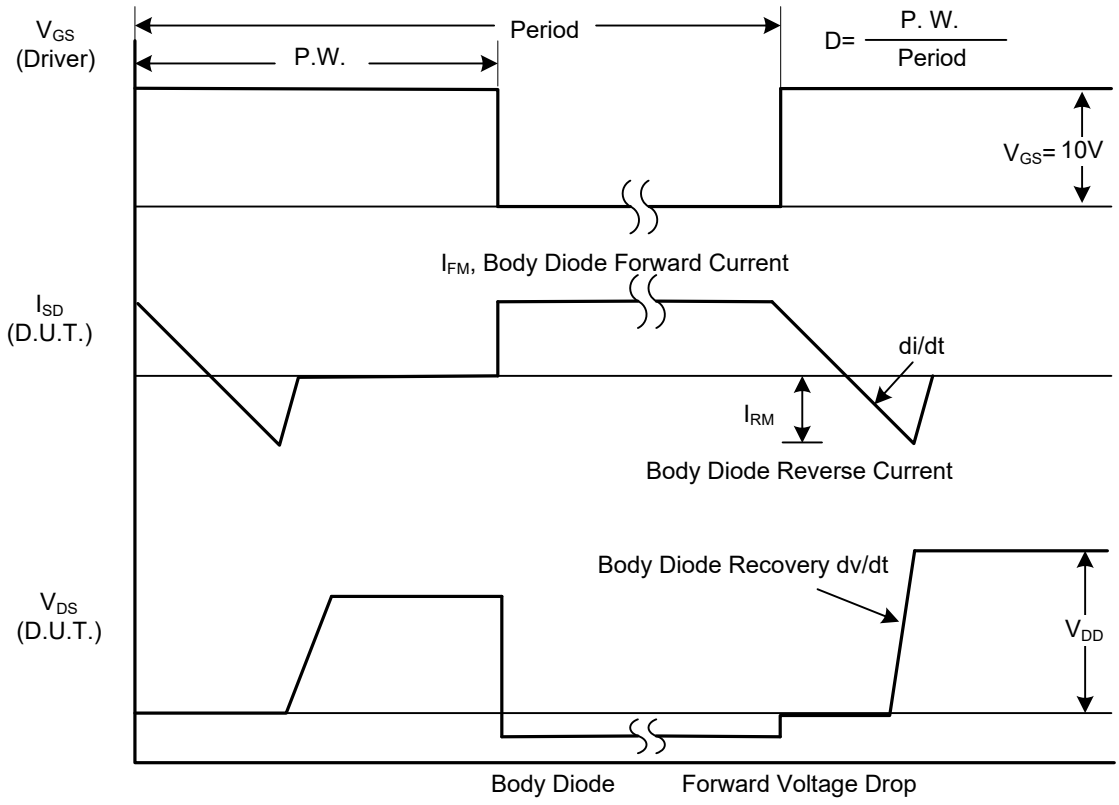
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250μA	600			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=600V, V_{GS}=0V			10	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=30V, V_{DS}=0V			100	nA
	Reverse		V_{GS}=-30V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	2.5		4.5	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=15A			0.13	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	V_{DS}=50V, V_{GS}=0V, f=1.0MHz		2450		pF
Output Capacitance		C_{OSS}			300		pF
Reverse Transfer Capacitance		C_{RSS}			15		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=480V, V_{GS}=10V, I_D=30A (Note 1, 2)		92.4		nC
Gate-Source Charge		Q_{GS}			21.2		nC
Gate-Drain Charge		Q_{GD}			38		nC
Turn-On Delay Time (Note 1)		$t_{D(ON)}$	V_{DS}=100V, V_{GS}=10V, I_D=30A, R_G=25Ω (Note 1, 2)		40		ns
Turn-On Rise Time		t_R			53		ns
Turn-Off Delay Time		$t_{D(OFF)}$			300		ns
Turn-Off Fall Time		t_F			140		ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Maximum Continuous Drain-Source Diode Forward Current		I_S				30	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				60	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=30A , V_{GS}=0V			1.4	V
Reverse Recovery Time (Note 1)		t_{rr}	I_S=30A , V_{GS}=0V di/dt=100A/μs		190		ns
Reverse Recovery Charge		Q_{rr}			2.8		μC

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

■ TEST CIRCUITS AND WAVEFORMS

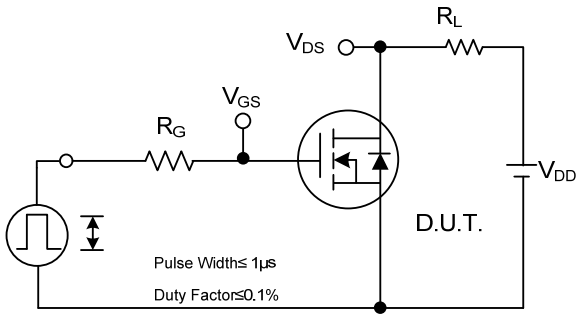


Peak Diode Recovery dv/dt Test Circuit

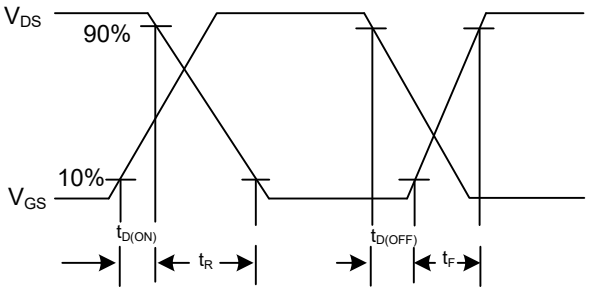


Peak Diode Recovery dv/dt Waveforms

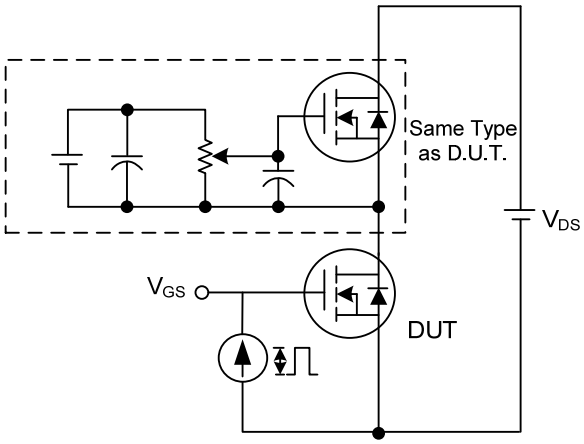
■ TEST CIRCUITS AND WAVEFORMS



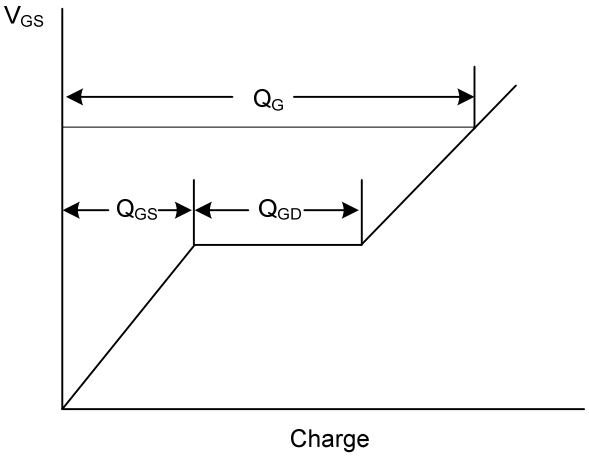
Switching Test Circuit



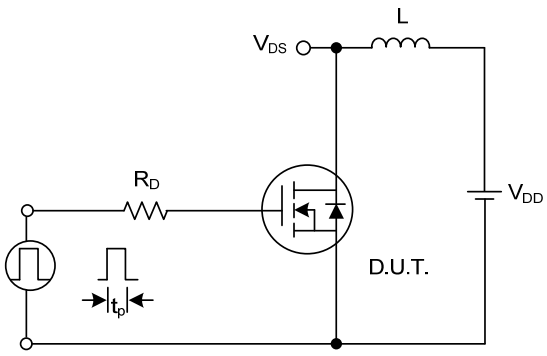
Switching Waveforms



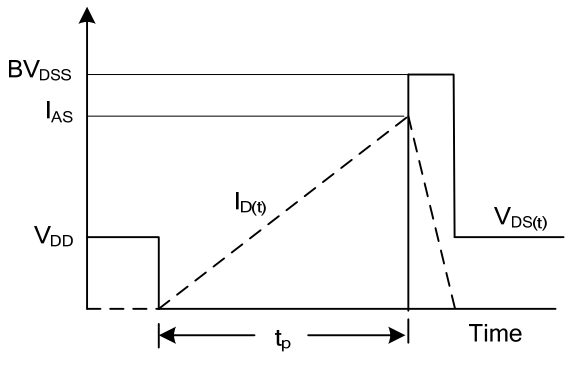
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms