



60NM60-U3

Preliminary

Power MOSFET

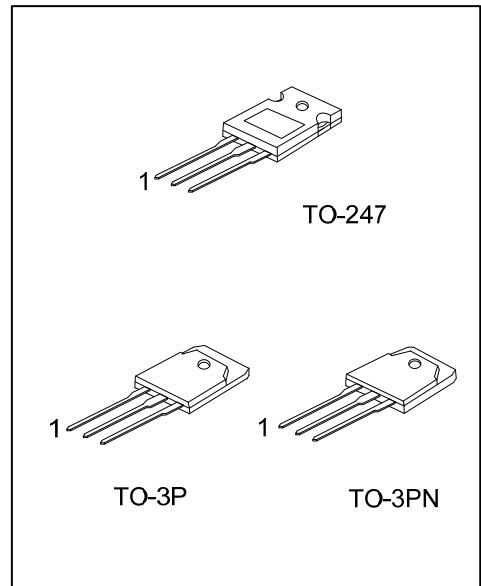
60A, 600V N-CHANNEL SUPER-JUNCTION MOSFET

DESCRIPTION

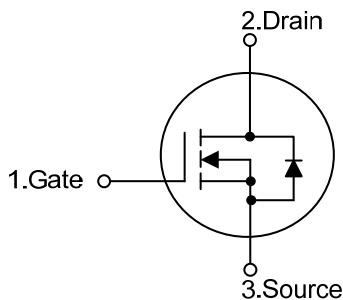
The **UTC 60NM60-U3** is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at AC-DC converters for power applications.

FEATURES

- * $R_{DS(ON)} \leq 48 \text{ m}\Omega @ V_{GS}=10\text{V}, I_D=30\text{A}$
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness



SYMBOL



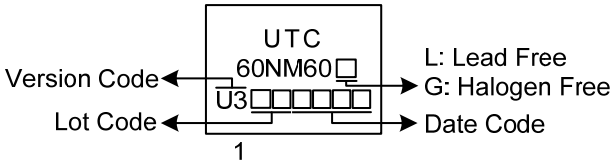
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
60NM60L-U3-T47-T	60NM60G-U3-T47-T	TO-247	G	D	S	Tube
60NM60L-U3-T3P-T	60NM60G-U3-T3P-T	TO-3P	G	D	S	Tube
60NM60L-U3-T3N-T	60NM60G-U3-T3N-T	TO-3PN	G	D	S	Tube

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

60NM60G-U3-T47-T	(1)Packing Type	(1) T: Tube
	(2)Package Type	(2) T47: TO-247, T3P: TO-3P, T3N: TO-3PN
	(3)Version Code	(3) Version U3
	(4)Green Package	(4) G: Halogen Free and Lead Free, L: Lead Free

MARKING



■ 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
Drain Current	Continuous $T_C=25^\circ\text{C}$	I_D	60	A
	Pulsed (Note 2)	I_{DM}	180	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	1225	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.1	V/ns
Power Dissipation	TO-247	P_D	240	W
	TO-3P/TO-3PN		245	W
Junction Temperature		T_J	+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. $L = 100\text{mH}$, $I_{AS} = 4.9\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$ Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 30\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-247	θ_{JA}	40	$^\circ\text{C}/\text{W}$
	TO-3P/TO-3PN		30	$^\circ\text{C}/\text{W}$
Junction to Case	TO-247	θ_{JC}	0.52	$^\circ\text{C}/\text{W}$
	TO-3P/TO-3PN		0.51	$^\circ\text{C}/\text{W}$

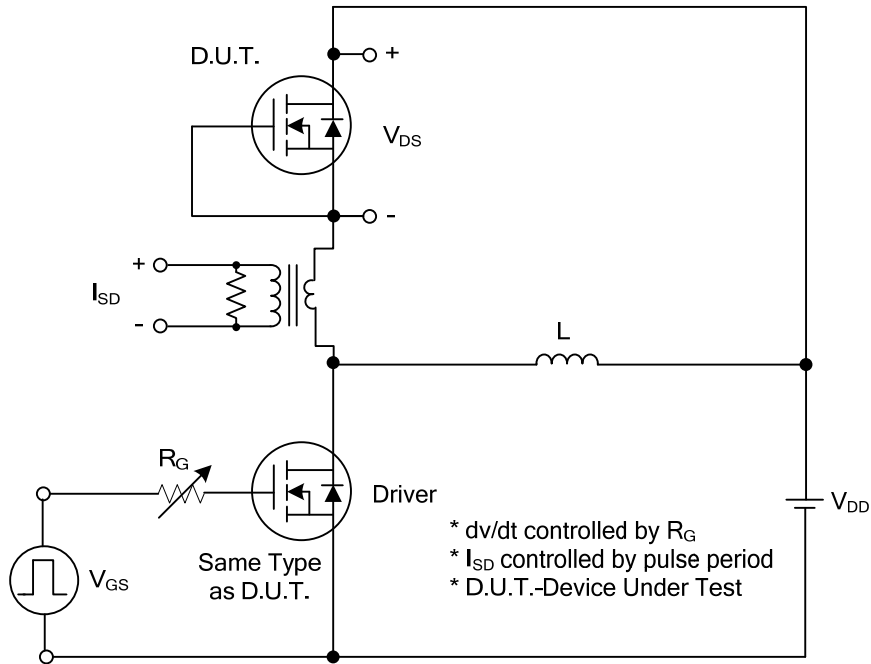
■ ELECTRICAL CHARACTERISTICS (T_J =25°C, unless otherwise specified)

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	I _{GSS}	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 =30A			48	mΩ
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =50V, f=1MHz		4987		pF
Output Capacitance	C _{OSS}			1577		pF
Reverse Transfer Capacitance	C _{RSS}			45		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q _G	V _{DS} =480V, V _{GS} =10V, I _D =1A (Note 1, 2)		203		nC
Gate-Source Charge	Q _{GS}			24		nC
Gate-Drain Charge	Q _{DD}			93		nC
Turn-On Delay Time	t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =1A, R _G =3Ω (Note 1, 2)		25		ns
Turn-On Rise Time	t _R			31		ns
Turn-Off Delay Time	t _{D(OFF)}			512		ns
Turn-Off Fall Time	t _F			171		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				60	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				120	A
Drain-Source Diode Forward Voltage	V _{SD}	I _S =60A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time	t _{rr}	I _S =30A, V _{GS} =0V, dI _F /dt=100A/μs		624		nS
Body Diode Reverse Recovery Charge	Q _{rr}				13	

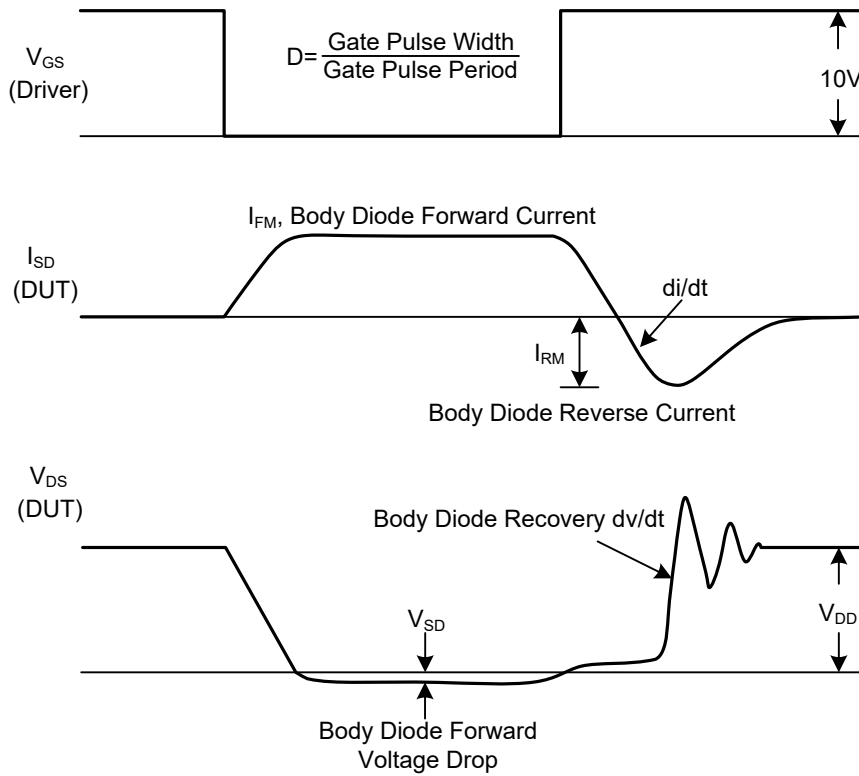
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

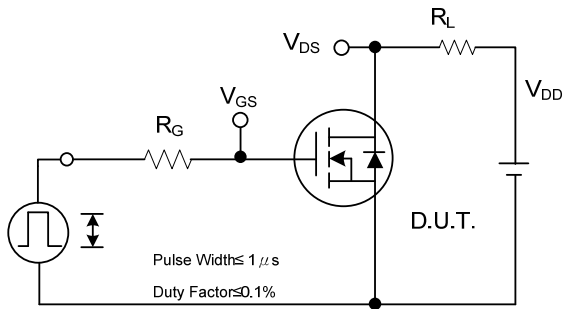


Peak Diode Recovery dv/dt Test Circuit

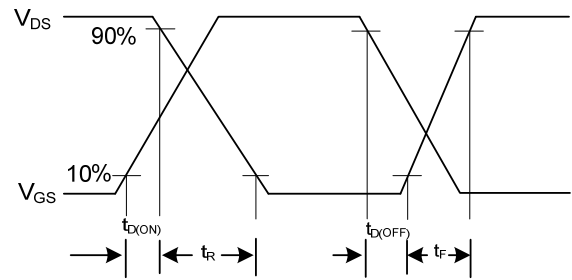


Peak Diode Recovery dv/dt Waveforms

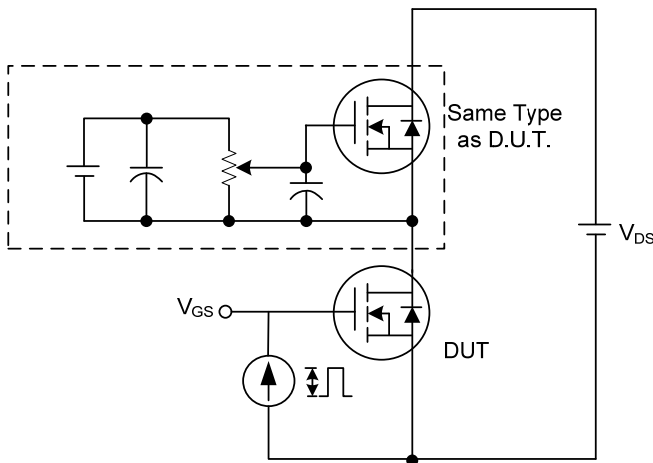
■ TEST CIRCUITS AND WAVEFORMS



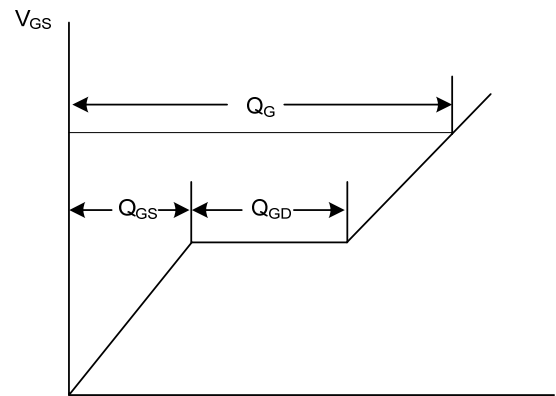
Switching Test Circuit



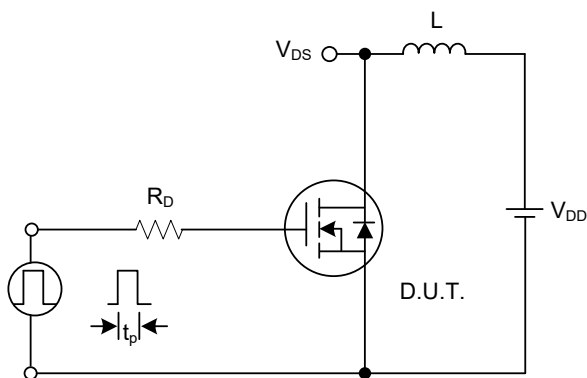
Switching Waveforms



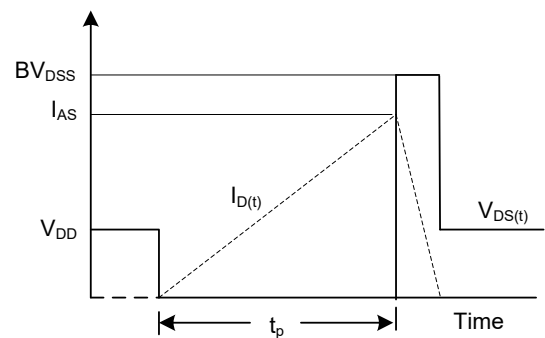
Gate Charge Test Circuit



Charge
Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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