

**10NM60-U3**

Preliminary

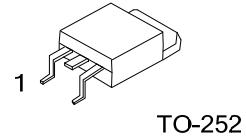
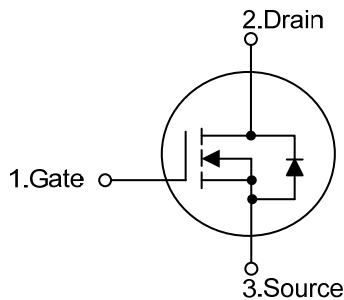
Power MOSFET

**10A, 600V N-CHANNEL
SUPER-JUNCTION MOSFET****■ DESCRIPTION**

The **UTC 10NM60-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

- * $R_{DS(ON)} \leq 0.42 \Omega$ @ $V_{GS}=10V$, $I_D=5.0A$
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness

■ SYMBOL

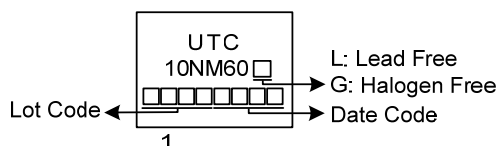
TO-252

■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
10NM60L-TN3-R	10NM60G-TN3-R	TO-252	G	D	S	Tape Reel

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

	(1) Packing Type	(1) R: Tape Reel
	(2) Package Type	(2) TN3: TO-252
	(3) Green Package	(3) 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°C	I _D	10	A
		T _C =100°C		6.5	A
	Pulsed (Note 2)		I _{DM}	30	A
Avalanche Energy	Single Pulsed (Note 3)		E _{AS}	242	mJ
Peak Diode Recovery dv/dt (Note 4)			dv/dt	3.7	V/ns
Power Dissipation			P _D	59	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. $L = 100\text{mH}$, $I_{AS} = 2.2\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, 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	θ_{JA}	110	$^{\circ}\text{C}/\text{W}$
Junction to Case	θ_{JC}	2.1	$^{\circ}\text{C}/\text{W}$

Note: Device mounted on FR-4 substrate P_C board, 2oz copper, with 1inch square copper plate.

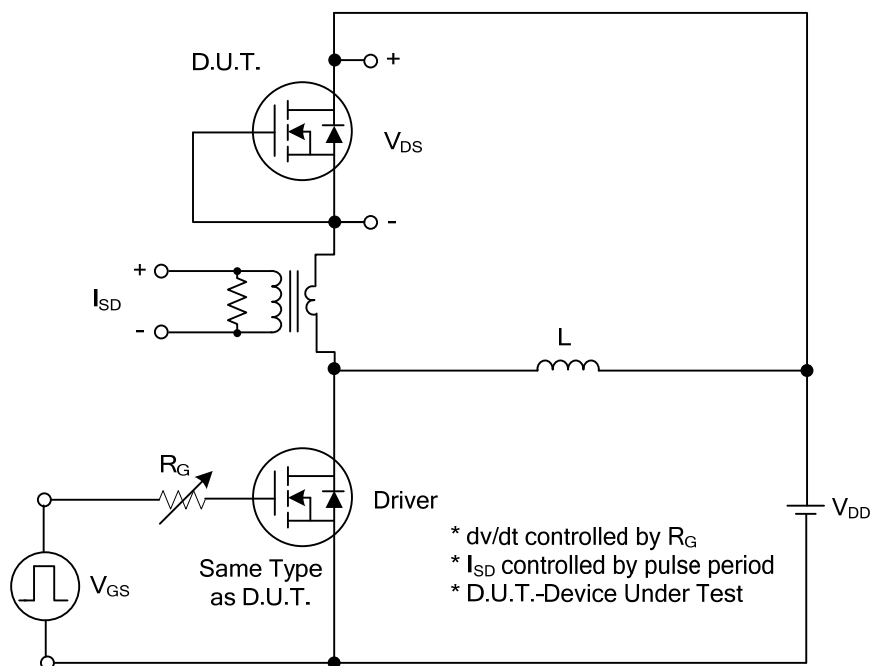
■ ELECTRICAL CHARACTERISTICS ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

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 =5.0A			0.42	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =50V, f=1MHz		680		pF
Output Capacitance	C _{OSS}			74		pF
Reverse Transfer Capacitance	C _{RSS}			4.5		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q _G	V _{DS} =480V, V _{GS} =10V, I _D =10A (Note 1, 2)		36		nC
Gate-Source Charge	Q _{GS}			10		nC
Gate-Drain Charge	Q _{DD}			14		nC
Turn-On Delay Time	t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =10A, R _G =25Ω (Note 1, 2)		7.2		ns
Turn-On Rise Time	t _R			18		ns
Turn-Off Delay Time	t _{D(OFF)}			72		ns
Turn-Off Fall Time	t _F			36		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I _S				10	A
Maximum Body-Diode Pulsed Current	I _{SM}				30	A
Drain-Source Diode Forward Voltage	V _{SD}	I _S =10A, V _{GS} =0V			1.4	V
Reverse Recovery Time	t _{rr}	I _S =30A, V _{GS} =0V,		300		nS
Reverse Recovery Charge (Note 1)	Q _{rr}	dl _F /dt=100A/μs		3.6		μC

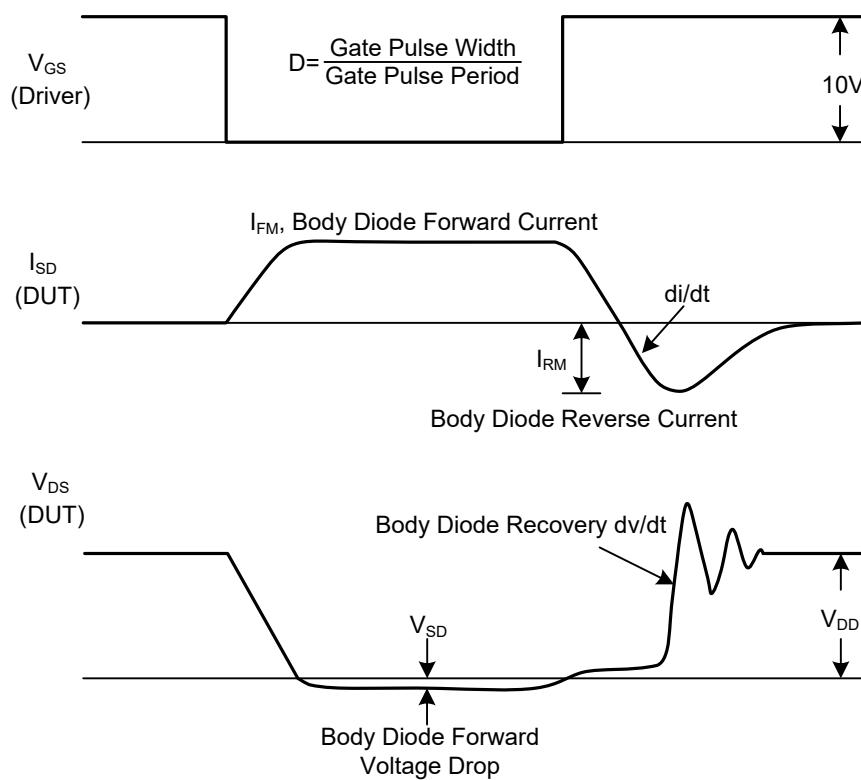
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

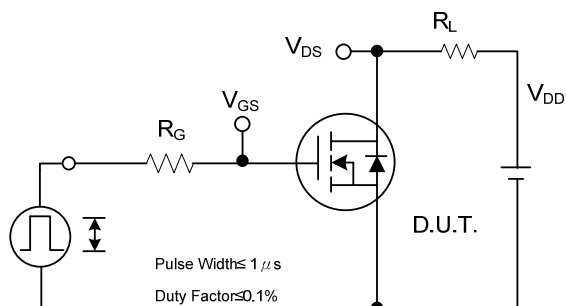


Peak Diode Recovery dv/dt Test Circuit

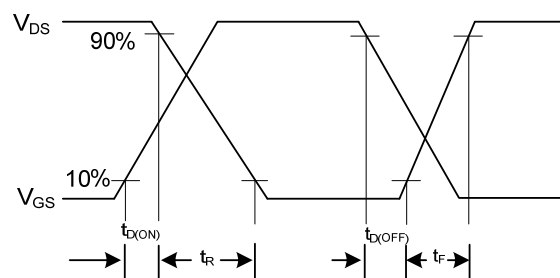


Peak Diode Recovery dv/dt Waveforms

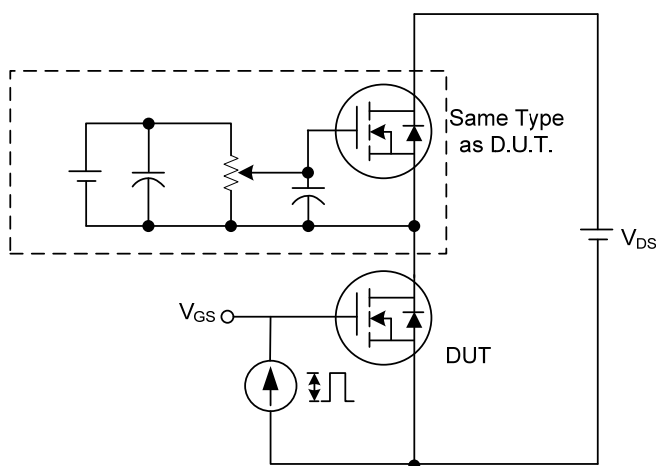
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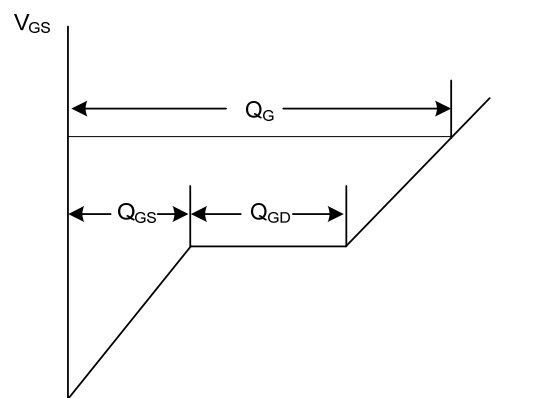
Switching Test Circuit



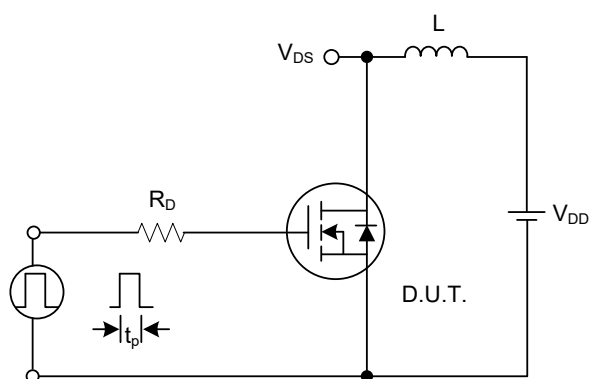
Switching Waveforms



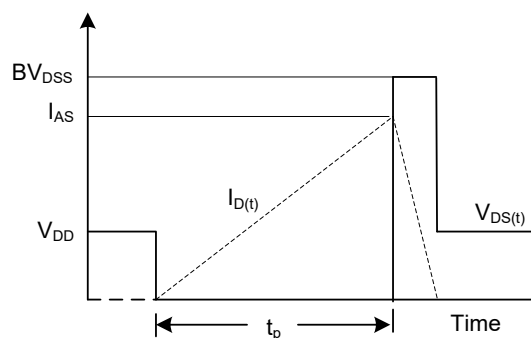
Gate Charge Test Circuit



Charge
Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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