



1NM60-U3

Preliminary

Power MOSFET

1.0A, 600V N-CHANNEL SUPER-JUNCTION MOSFET

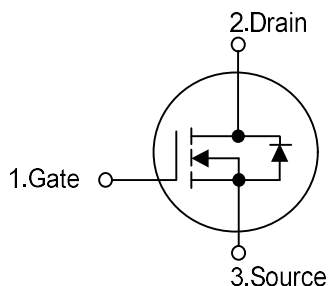
■ DESCRIPTION

The UTC **1NM60-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 high rugged avalanche characteristics. This power MOSFET is usually used in high speed switching applications at power supplies, PWM motor controls, high efficient AC to DC converters and bridge circuits.

■ FEATURES

- * $R_{DS(ON)} \leq 3.6 \Omega$ @ $V_{GS} = 10V$, $I_D = 0.5A$
- * Fast Switching Capability
- * Improved dv/dt Capability, High Ruggedness

■ SYMBOL

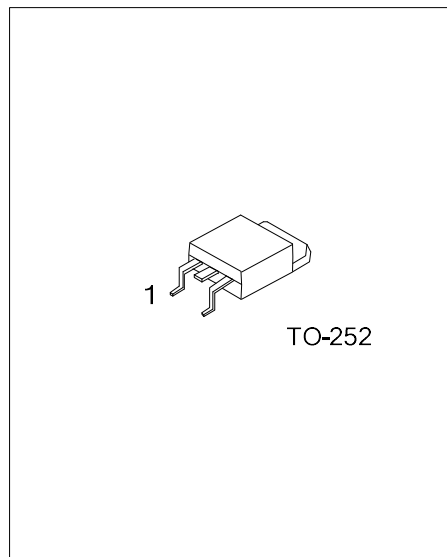


■ ORDERING INFORMATION

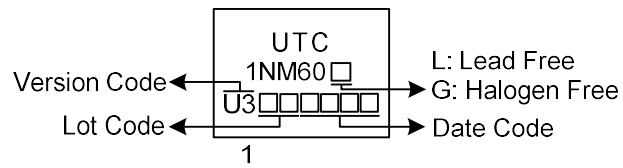
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
1NM60L-U3-TN3-R	1NM60G-U3-TN3-R	TO-252	G	D	S	Tape Reel

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

1NM60G-U3-TN3-R	(1)Packing Type (2)Package Type (3)Version Code (4)Green Package	(1) R: Tape Reel (2) TN3: TO-252 (3) Version U3 (4) G: Halogen Free and Lead Free, L: Lead Free
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■ 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
Drain Current	Continuous	I _D	1	A
	Pulsed (Note 2)	I _{DM}	3	A
Avalanche Energy	Single Pulsed (Note 3)	E _{AS}	9.5	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.8	V/ns
Power Dissipation		P _D	20	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 = 10mH, I_{AS} = 1.37A, V_{DD} = 50V, R_G = 25Ω Starting T_J = 25°C

4. I_{SD} ≤ 1.0A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		θ _{JA}	110	°C/W
Junction to Case		θ _{JC}	6.25 (Note)	°C/W

Note: The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.

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

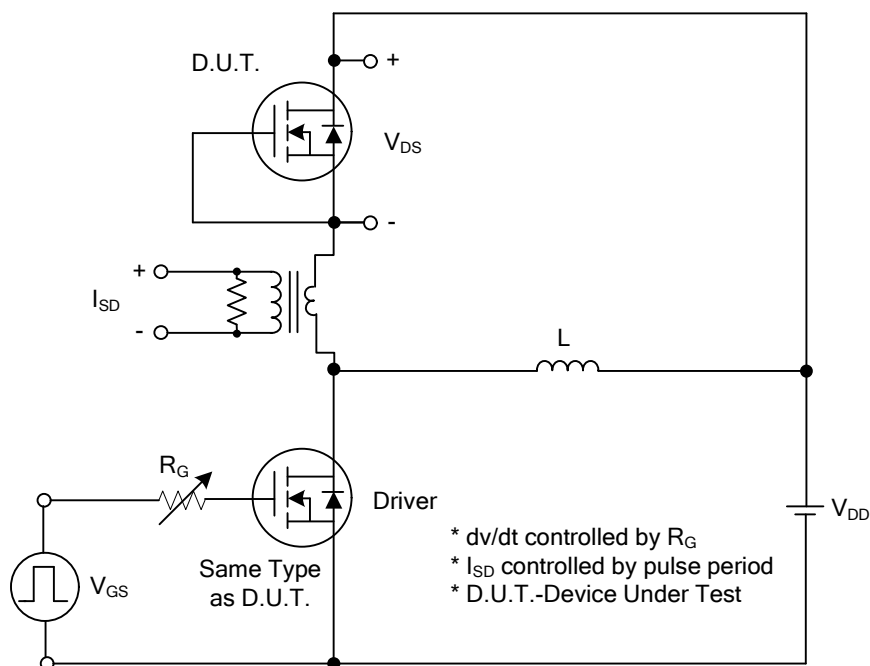
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250μA	600			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =600V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{GS} =30V, V _{DS} =0V			100	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 =0.5A			3.6	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =50V, f=1.0MHz		81		pF
Output Capacitance		C _{OSS}			40		pF
Reverse Transfer Capacitance		C _{RSS}			5		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =480V, V _{GS} =10V, I _D =1.0A , (Note 1, 2)		11		nC
Gate to Source Charge		Q _{GS}			4		nC
Gate to Drain Charge		Q _{GD}			2		nC
Turn-ON Delay Time (Note 1)		t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =1.0A, R _G =25Ω (Note 1, 2)		4		ns
Rise Time		t _R			19		ns
Turn-OFF Delay Time		t _{D(OFF)}			29		ns
Fall-Time		t _F			47		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I _S				1	A
Maximum Pulsed Drain-Source Diode Forward Current		I _{SM}				3	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _S =1.0A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)		t _{rr}	I _S =1.0A, V _{GS} =0V,		158		ns

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Body Diode Reverse Recovery Charge	Q_{rr}	$di_F/dt=100A/\mu s$		3		μC

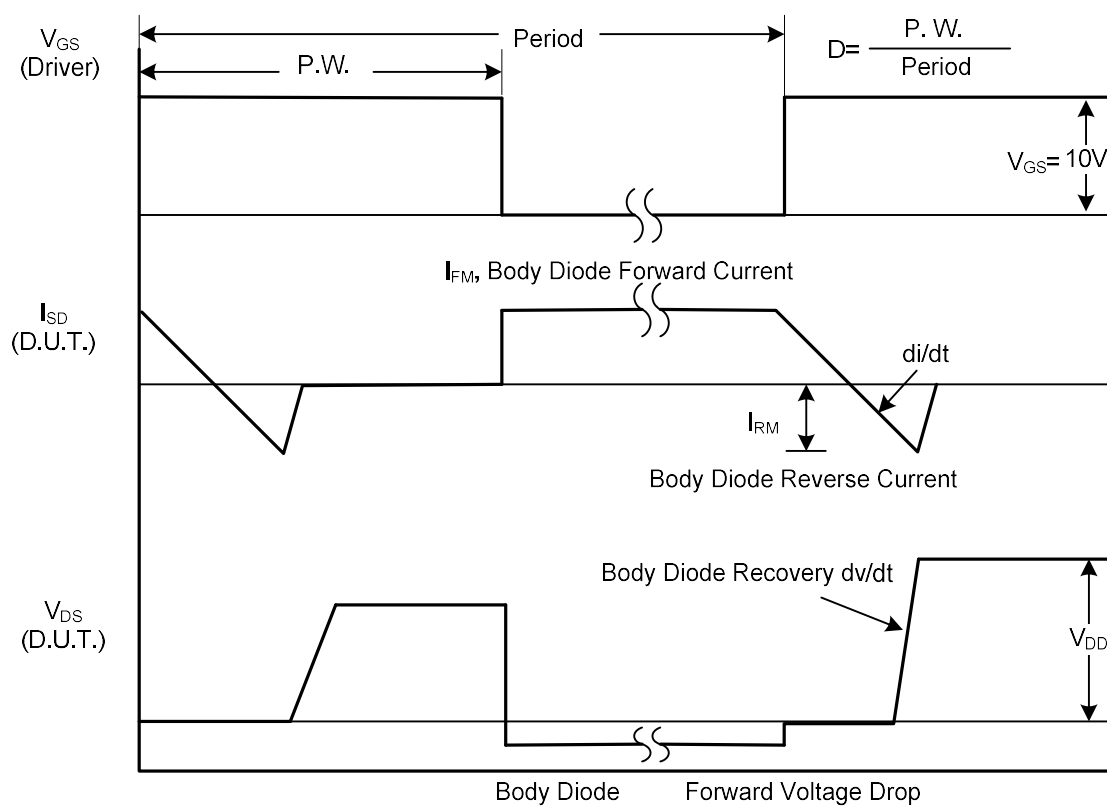
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

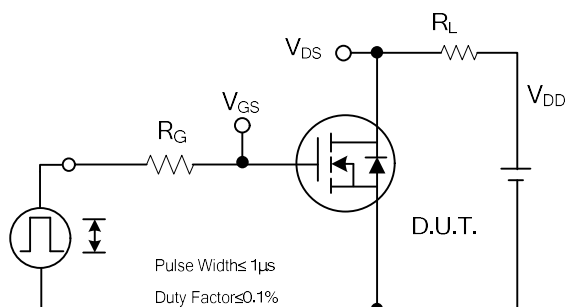


Peak Diode Recovery dv/dt Test Circuit

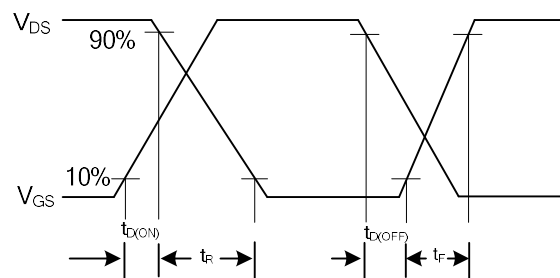


Peak Diode Recovery dv/dt Waveforms

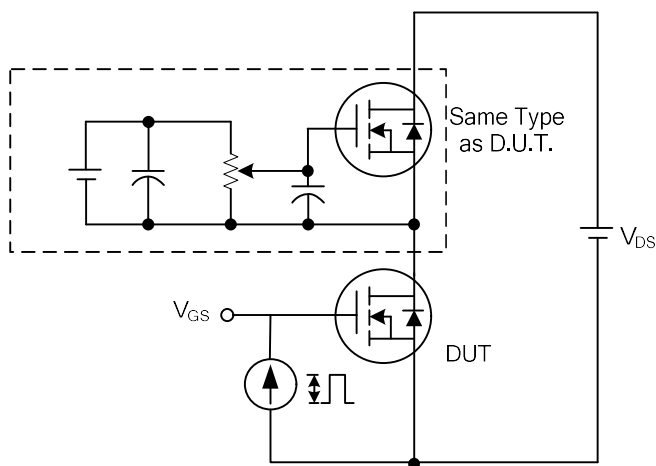
■ TEST CIRCUITS AND WAVEFORMS



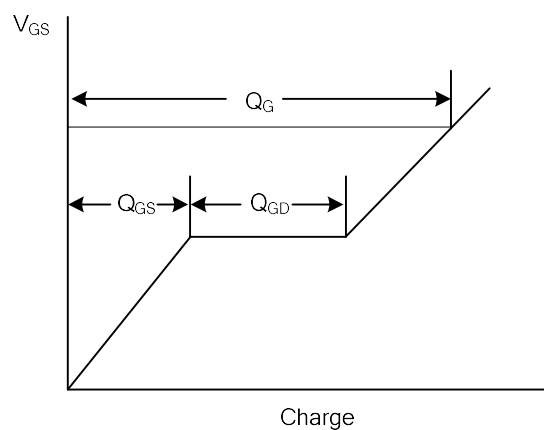
Switching Test Circuit



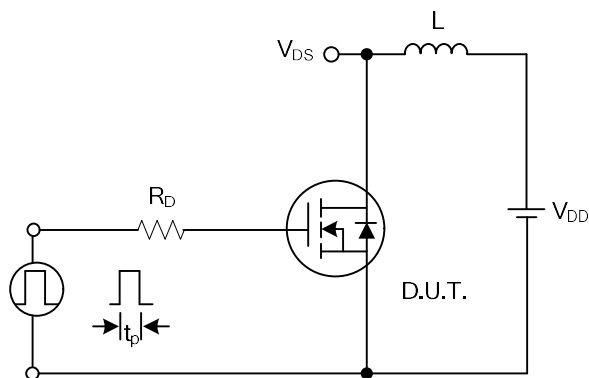
Switching Waveforms



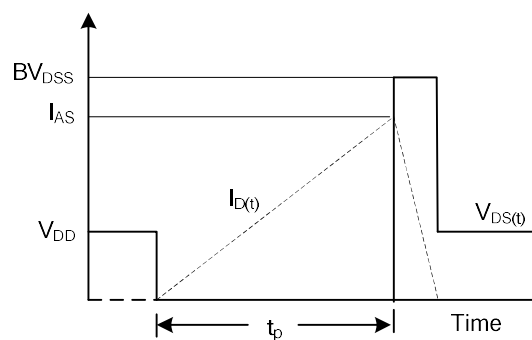
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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