



5NM70-FD

Power MOSFET

5A, 700V N-CHANNEL SUPER-JUNCTION MOSFET

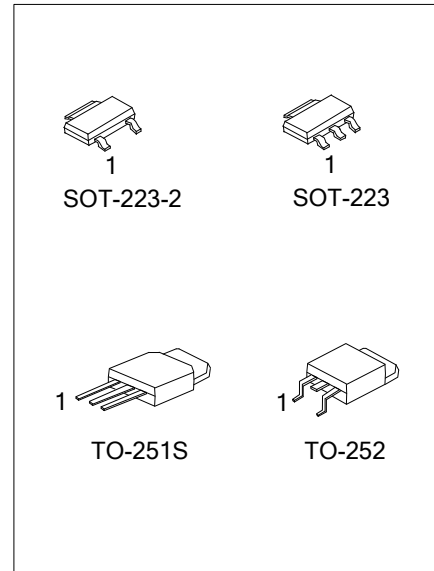
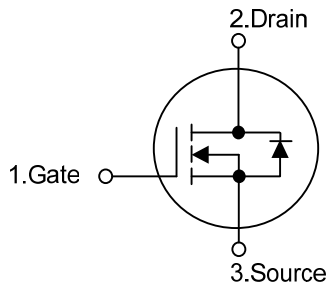
DESCRIPTION

The UTC **5NM70-FD** 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

- * $R_{DS(ON)} < 1.6\Omega$ @ $V_{GS} = 10V, I_D = 2.5A$
- * Fast Switching Capability
- * Improved dv/dt Capability, High Ruggedness

SYMBOL



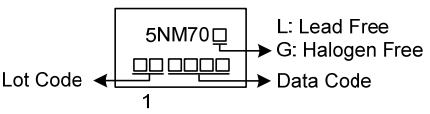
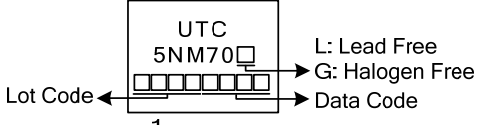
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
5NM70L-AA2-R	5NM70G-AA2-R	SOT-223-2	G	D	S	Tape Reel
5NM70L-AA3-R	5NM70G-AA3-R	SOT-223	G	D	S	Tape Reel
5NM70L-TMS-T	5NM70G-TMS-T	TO-251S	G	D	S	Tube
5NM70L-TN3-R	5NM70G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>5NM70G-AA2-R</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) R: Tape Reel, T: Tube</p> <p>(2) AA2: SOT-223-2, AA3: SOT-223, TN3: TO-252 TMS: TO-251S</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING

SOT-223-2 / SOT-223	TO-251S / TO-252
 <p>Diagram showing marking on a SOT-223-2 / SOT-223 package. The marking includes '5NM70' and a small square symbol. Below it are four small squares representing a data code. To the left is 'Lot Code' and to the right is 'Data Code'. Below the package is the number '1'. To the right of the package, 'L: Lead Free' and 'G: Halogen Free' are indicated with arrows.</p>	 <p>Diagram showing marking on a TO-251S / TO-252 package. The marking includes 'UTC', '5NM70', and a small square symbol. Below it are six small squares representing a data code. To the left is 'Lot Code' and to the right is 'Data Code'. Below the package is the number '1'. To the right of the package, 'L: Lead Free' and 'G: Halogen Free' are indicated with arrows.</p>

■ ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	700	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	5.0	A
	Pulsed (Note 2)	I_{DM}	20	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	95	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	17	V/ns
Power Dissipation	SOT-223-2/SOT-223	P_D	12	W
	TO-251S/TO-252		54	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. $L=66\text{mH}$, $I_{AS}=1.7\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^\circ\text{C}$
4. $I_{SD}\leq 5.0\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

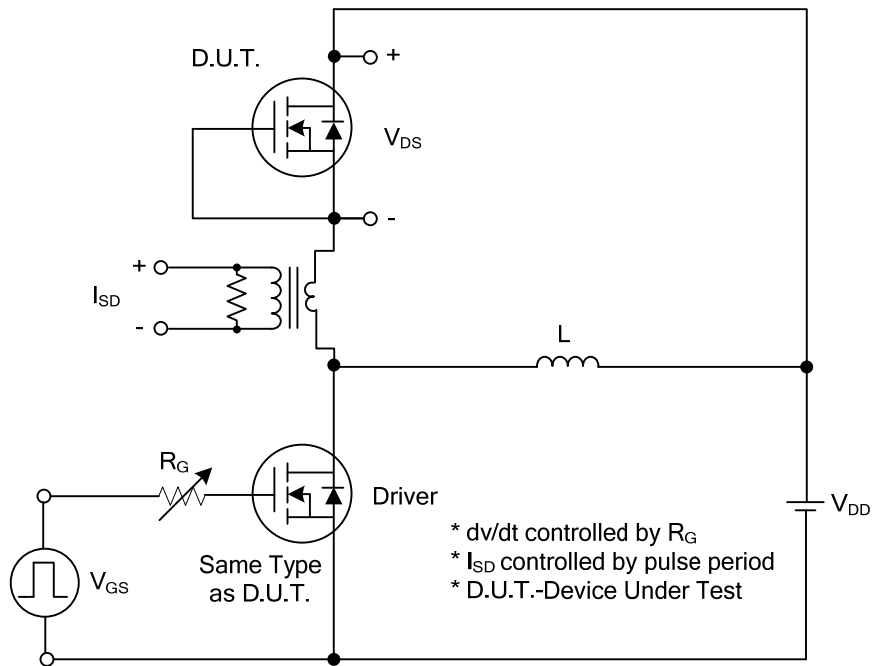
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-223-2/SOT-223	θ_{JA}	150	$^\circ\text{C}/\text{W}$
	TO-251S/TO-252		110	$^\circ\text{C}/\text{W}$
Junction to Case	SOT-223-2/SOT-223	θ_{JC}	10.4	$^\circ\text{C}/\text{W}$
	TO-251S/TO-252		2.3	$^\circ\text{C}/\text{W}$

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

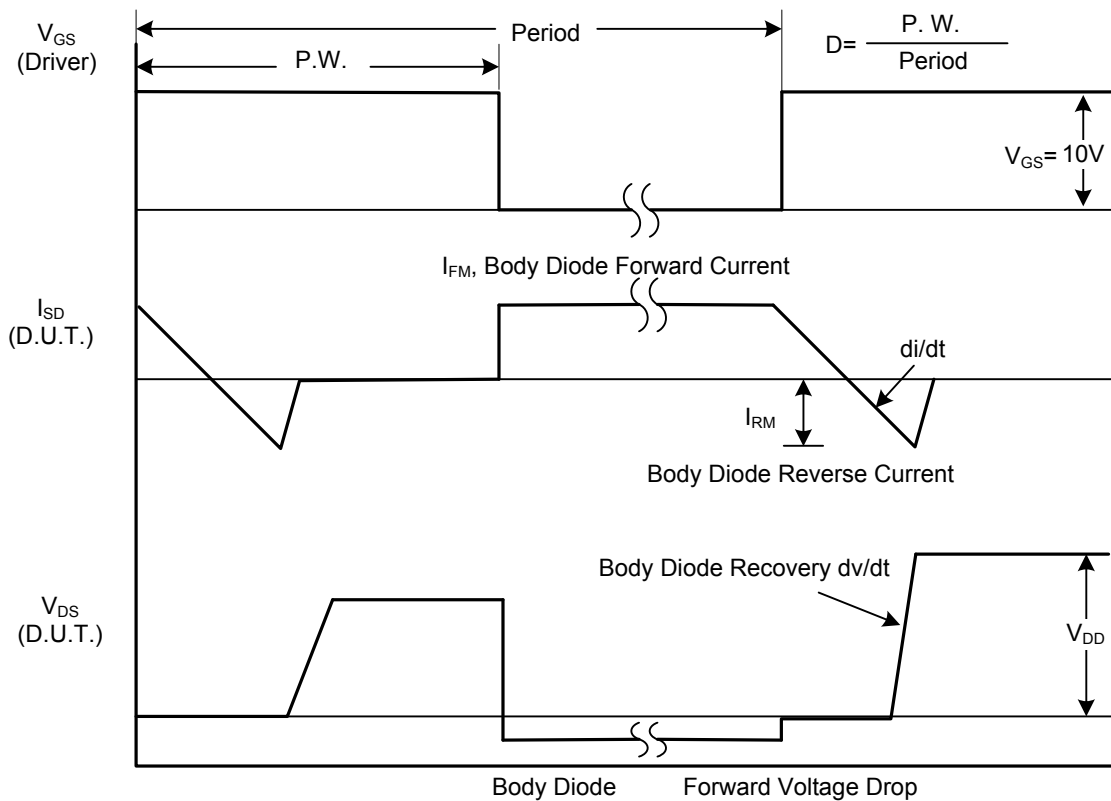
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	700			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =700V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	Forward	V _{GS} =30V, V _{DS} =0V V _{GS} =-30V, V _{DS} =0V			100	nA
	Reverse				-100	
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 =2.5A			1.6	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz		240		pF
Output Capacitance	C _{OSS}			130		pF
Reverse Transfer Capacitance	C _{RSS}			16		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 1)	Q _G	V _{DS} =50V, V _{GS} =10V, I _D =1.3A, I _G =100μA (Note 1, 2)		33		nC
Gate to Source Charge	Q _{GS}			3		nC
Gate to Drain Charge	Q _{GD}			7		nC
Turn-ON Delay Time (Note 1)	t _{D(ON)}	V _{DD} =30V, V _{GS} =10V, I _D =0.5A, R _G =25Ω (Note 1, 2)		34		ns
Rise Time	t _R			50		ns
Turn-OFF Delay Time	t _{D(OFF)}			136		ns
Fall-Time	t _F			36		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I _S				5.0	A
Maximum Body-Diode Pulsed Current	I _{SM}				20	A
Drain-Source Diode Forward Voltage (Note 1)	V _{SD}	I _S =5.0A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t _{rr}	I _S =5.0A, V _{GS} =0V, dI _F /dt=100A/μs		125		ns
Body Diode Reverse Recovery Charge	Q _{rr}				0.51	

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

TEST CIRCUITS AND WAVEFORMS

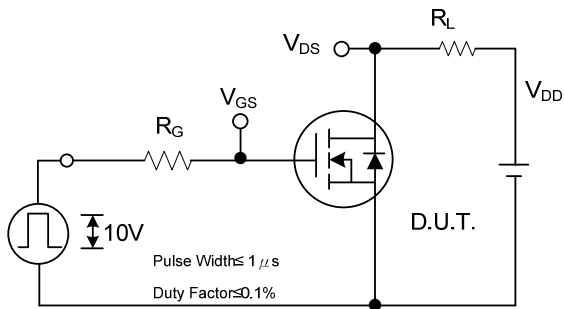


Peak Diode Recovery dv/dt Test Circuit

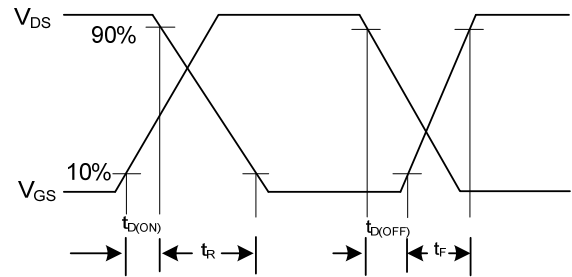


Peak Diode Recovery dv/dt Waveforms

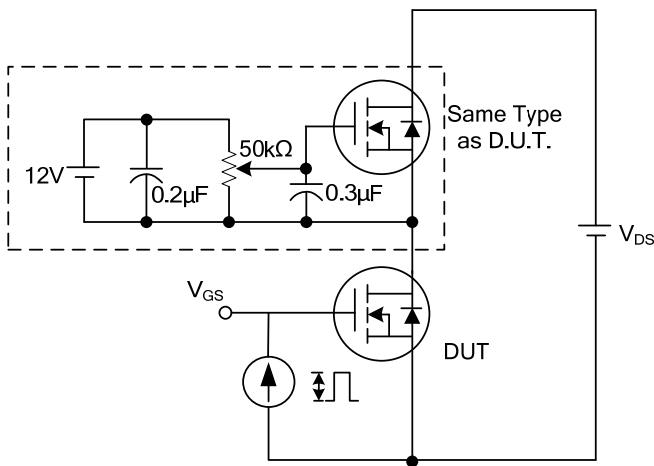
TEST CIRCUITS AND WAVEFORMS (Cont.)



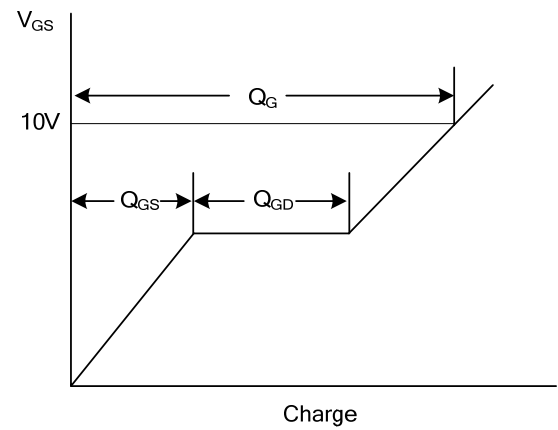
Switching Test Circuit



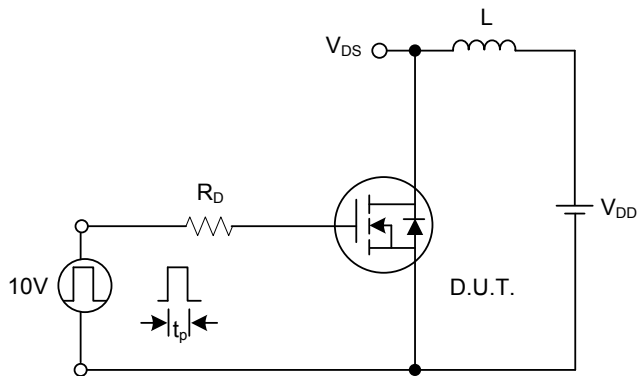
Switching Waveforms



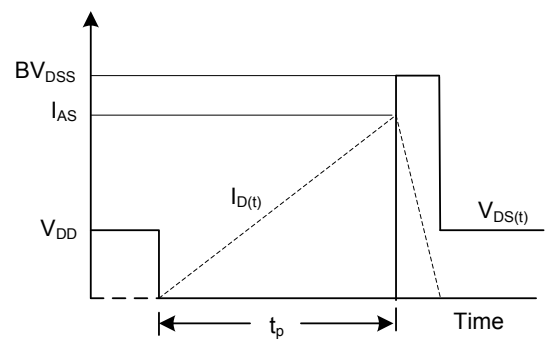
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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