



05NM70

Preliminary

Power MOSFET

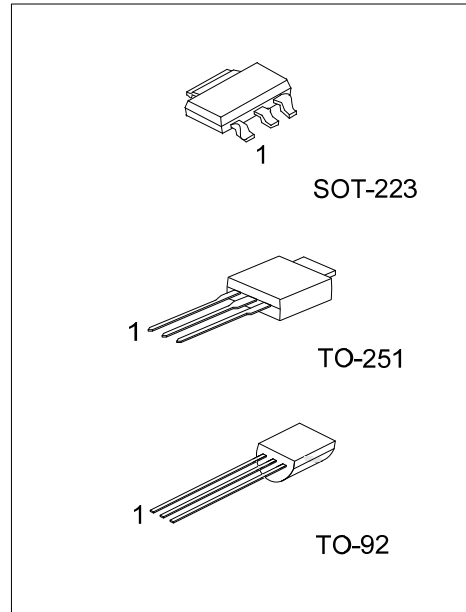
0.5A, 700V N-CHANNEL SUPER-JUNCTION MOSFET

DESCRIPTION

The UTC **05NM70** is an Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

FEATURES

- * $R_{DS(on)} < 14.4 \Omega @ V_{GS}=10V, I_D=0.25A$
- * High breakdown voltage



ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
-	05NM70G-AA3-R	SOT-223	G	D	S	Tape Reel
05NM70L-TM3-T	05NM70G-TM3-T	TO-251	G	D	S	Tube
05NM70L-T92-B	05NM70G-T92-B	TO-92	G	D	S	Tape Box
05NM70L-T92-K	05NM70G-T92-K	TO-92	G	D	S	Bulk

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

<p>05NM70G-AA3-R</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p>	<p>(1) R: Tape Reel, T: Tube, B: Tape Box, K: Bulk (2) AA3: SOT-223, TM3: TO-251, T92: TO-92 (3) L: Lead Free, G: Halogen Free and Lead Free</p>
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MARKING

SOT-223	TO-251	TO-92
<p>05NM70G □□□□ → Data Code 1</p>	<p>UTC 05NM70□ □□□□□□ → Data Code Lot Code ← □ 1</p> <p>L: Lead Free G: Halogen Free</p>	<p>UTC 05NM70□ □□□ → Data Code 1</p> <p>L: Lead Free G: Halogen Free</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	0.5	A
	Pulsed	I_{DM}	2.0	A
Avalanche Current (Note 2)		I_{AR}	0.8	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	3.2	mJ
Power Dissipation	SOT-223	P_D	9	W
	TO-251		27.5	W
	TO-92		1.4	W
Junction Temperature		T_J	150	$^\circ\text{C}$
Storage Temperature Range		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. $L = 10\text{mH}$, $I_{AS} = 0.8\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

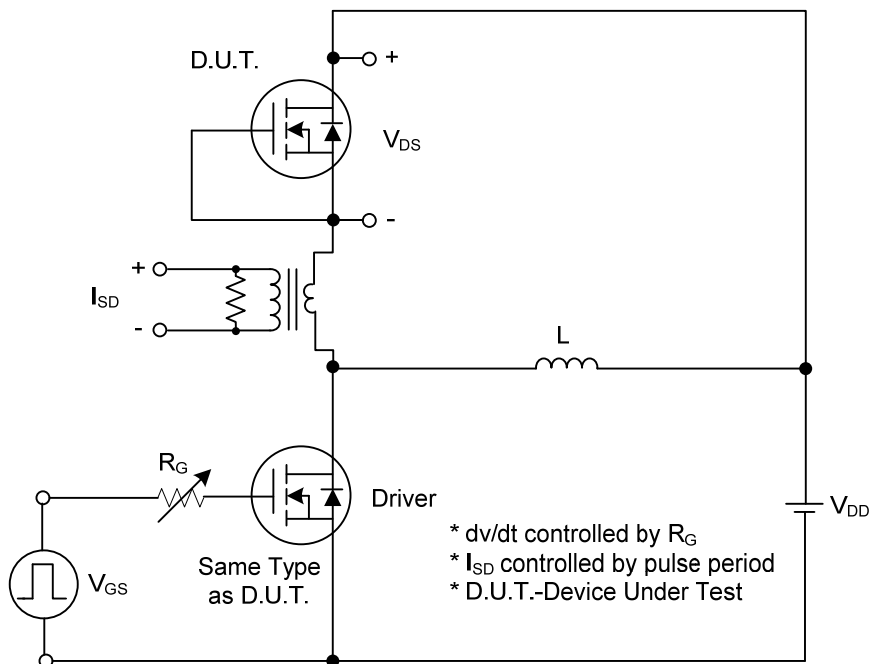
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-223	θ_{JA}	150	$^\circ\text{C/W}$
	TO-251		110	$^\circ\text{C/W}$
	TO-92		180	$^\circ\text{C/W}$
Junction to Case	SOT-223	θ_{JC}	14	$^\circ\text{C/W}$
	TO-251		4.53	$^\circ\text{C/W}$
	TO-92		88	$^\circ\text{C/W}$

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

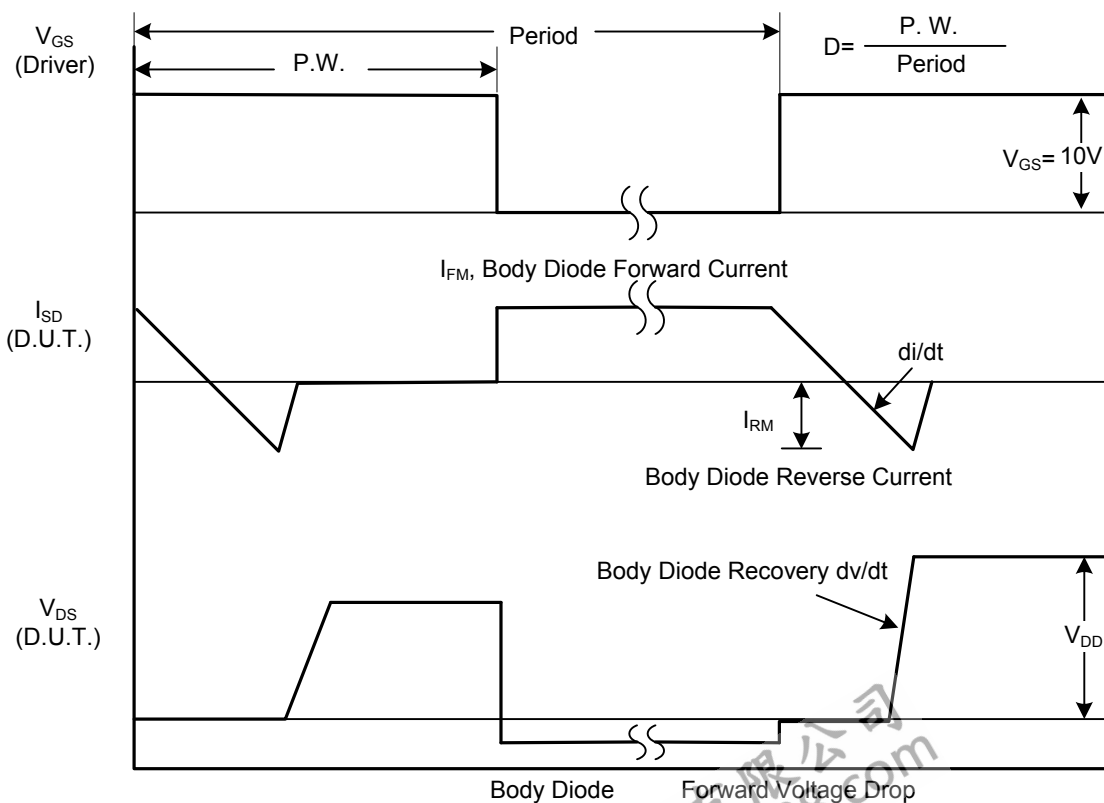
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$	700			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 700\text{V}$, $V_{GS} = 0\text{V}$			10	μA
Gate-Source Leakage Current	Forward	$V_{GS} = +30\text{V}$, $V_{DS} = 0\text{V}$ $V_{GS} = -30\text{V}$, $V_{DS} = 0\text{V}$			+100	nA
	Reverse				-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$	2.5		4.5	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{V}$, $I_D = 0.25\text{A}$			14.4	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS} = 0\text{V}$, $V_{DS} = 25\text{V}$, $f = 1.0\text{MHz}$		40		pF
Output Capacitance	C_{OSS}			22		pF
Reverse Transfer Capacitance	C_{RSS}			5		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note 1)	Q_G	$V_{DS} = 50\text{V}$, $V_{GS} = 10\text{V}$, $I_D = 1.3\text{A}$, $I_D = 100\mu\text{A}$ (Note 1, 2)		7		nC
Gate to Source Charge	Q_{GS}			1.5		nC
Gate to Drain Charge	Q_{GD}			2		nC
Turn-ON Delay Time (Note 1)	$t_{D(ON)}$	$V_{DS} = 30\text{V}$, $V_{GS} = 10\text{V}$, $I_D = 0.5\text{A}$, $R_G = 25\Omega$ (Note 1, 2)		32		ns
Rise Time	t_R			22		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			28		ns
Fall-Time	t_F			26		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				0.5	A
Maximum Body-Diode Pulsed Current	I_{SM}				2.0	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_S = 0.5\text{A}$, $V_{GS} = 0\text{V}$			1.4	V

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

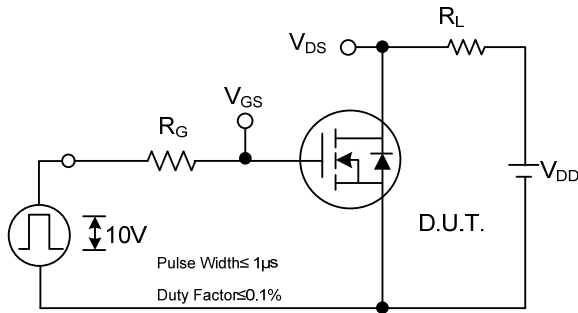


Peak Diode Recovery dv/dt Test Circuit

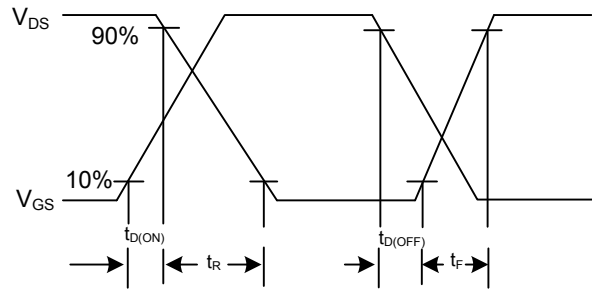


Peak Diode Recovery dv/dt Waveforms

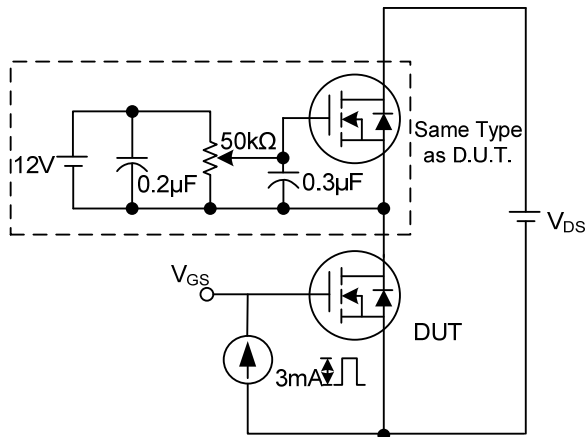
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



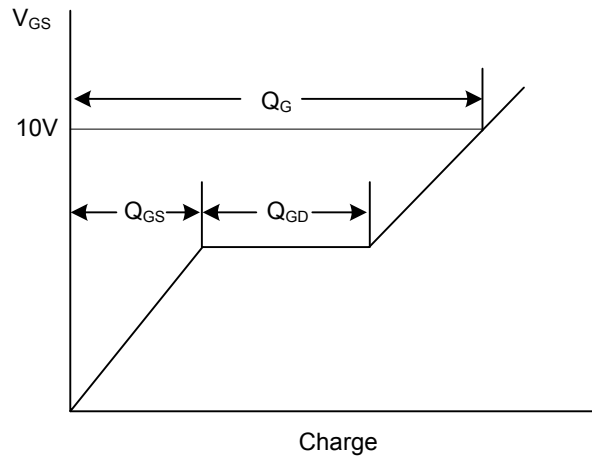
Switching Test Circuit



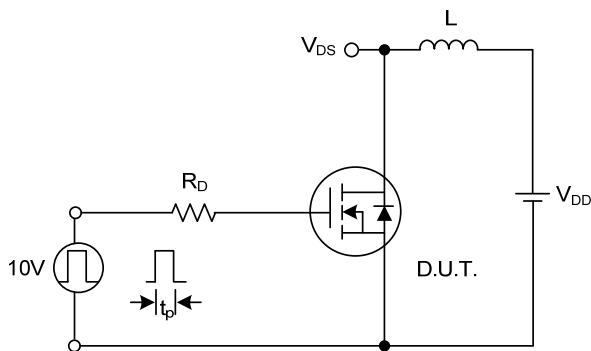
Switching Waveforms



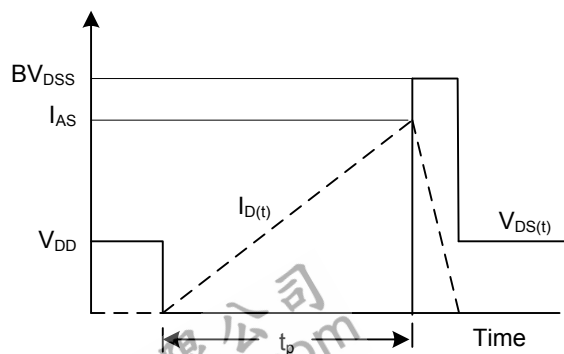
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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