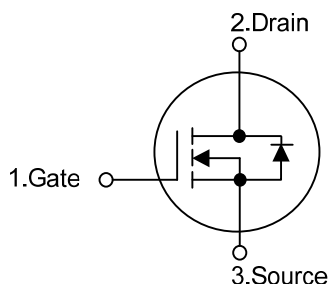


**05N60-CB****Power MOSFET****0.5A, 600V N-CHANNEL
POWER MOSFET****DESCRIPTION**

The UTC **05N60-CB** is a high voltage MOSFET 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 AC to DC converters and bridge circuits.

FEATURES

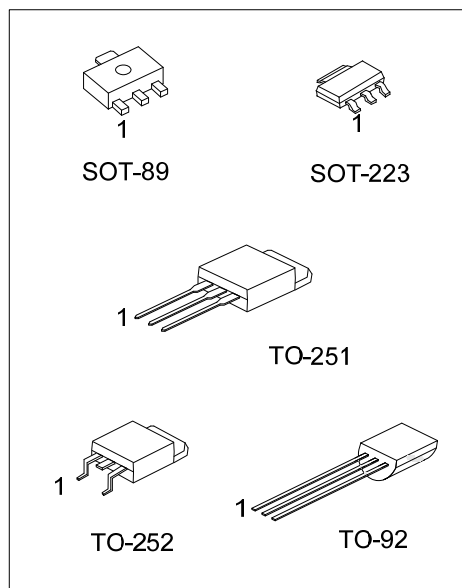
- * $R_{DS(ON)} \leq 23 \Omega$ @ $V_{GS} = 10V$, $I_D = 0.25A$
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness

SYMBOL**ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
05N60L-AA3-R	05N60G-AA3-R	SOT-223	G	D	S	Tape Reel
05N60L-AB3-R	05N60G-AB3-R	SOT-89	G	D	S	Tape Reel
05N60L-TM3-T	05N60G-TM3-T	TO-251	G	D	S	Tube
05N60L-TN3-R	05N60G-TN3-R	TO-252	G	D	S	Tape Reel
05N60L-T92-B	05N60G-T92-B	TO-92	G	D	S	Tape Box
05N60L-T92-K	05N60G-T92-K	TO-92	G	D	S	Bulk

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

05N60G-AA3-R	(1)Packing Type	(1) R: Tape Reel, T: Tube, B: Tape Box, K: Bulk (2) AA3: SOT-223, AB3: SOT-89, TM3: TO-251, TN3: TO-252, T92: TO-92 (3) G: Halogen Free and Lead Free, L: Lead Free
	(2)Package Type	
	(3)Green Package	



MARKING

PACKAGE	MARKING
SOT-223	SOT-89
05N60 Lot Code 1 L: Lead Free G: Halogen Free Date Code	05N60 1 Lot Code Date Code L: Lead Free G: Halogen Free
TO-251 / TO-252	TO-92
UTC 05N60 Lot Code 1 L: Lead Free G: Halogen Free Date Code	UTC 05N60 Lot Code 1 L: Lead Free G: Halogen Free Date Code

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DS}	600	V
Gate-Source Voltage		V_{GS}	± 30	V
Continuous Drain Current		I_D	0.5	A
Pulsed Drain Current (Note 2)		I_{DM}	2	A
Avalanche Energy	Single Pulse(Note 3)	E_{AS}	25	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/ dt	4.5	V/ns
Power Dissipation	SOT-223	P_D	1.2	W
	SOT-89		1	W
	TO-251/TO-252		25	W
	TO-92		0.8	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. $L=150\text{mH}$, $I_{AS}=0.5\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

4. $I_{SD} \leq 1.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DS}$, Starting $T_J=25^\circ\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-223	θ_{JA}	160	$^\circ\text{C}/\text{W}$
	SOT-89		170	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		110	$^\circ\text{C}/\text{W}$
	TO-92		160	$^\circ\text{C}/\text{W}$
Junction to Case	SOT-223	θ_{JC}	104	$^\circ\text{C}/\text{W}$
	SOT-89		125	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		5	$^\circ\text{C}/\text{W}$
	TO-92		156	$^\circ\text{C}/\text{W}$

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

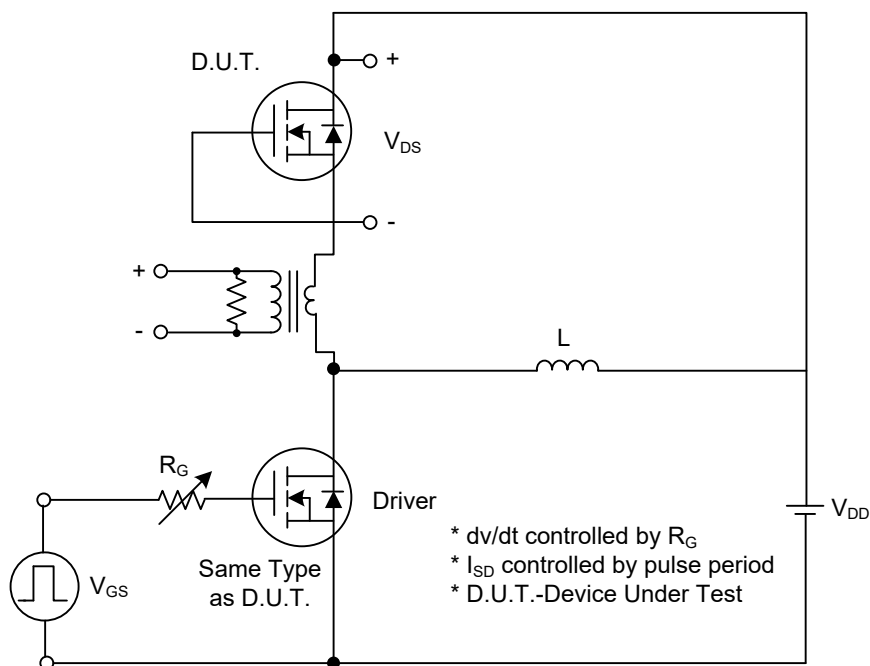
■ **ELECTRICAL CHARACTERISTICS** ($T_J=25^{\circ}\text{C}$, unless otherwise specified.)

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 (T _J =25°C)		I _{DSS}	V _{DS} =600V, V _{GS} =0V			10	μA
Drain-Source Leakage Current (T _J =125°C)						10	
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	2.0		4.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =0.25A			23	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1MHz		87		pF
Output Capacitance		C _{OSS}			12		pF
Reverse Transfer Capacitance		C _{RSS}			5		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =50V, V _{GS} =10V, I _D =1.3A, (Note 1, 2)		7.0		nC
Gate-Source Charge		Q _{GS}			1.0		nC
Gate-Drain Charge		Q _{GD}			0.5		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)		18		ns
Turn-On Rise Time		t _r			16		ns
Turn-Off Delay Time		t _{D (OFF)}			38		ns
Turn-Off Fall Time		t _f			28		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I _S				1.0	A
Maximum Pulsed Drain-Source Diode Forward Current		I _{SM}				4.0	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	V _{GS} =0V, I _{SD} = 0.5A			1.6	V
Reverse Recovery Time (Note 1)		t _{rr}	V _{GS} =0V, I _{SD} = 1.0A		375		ns
Reverse Recovery Charge		Q _{rr}	di/dt = 100A/μs		0.4		μC

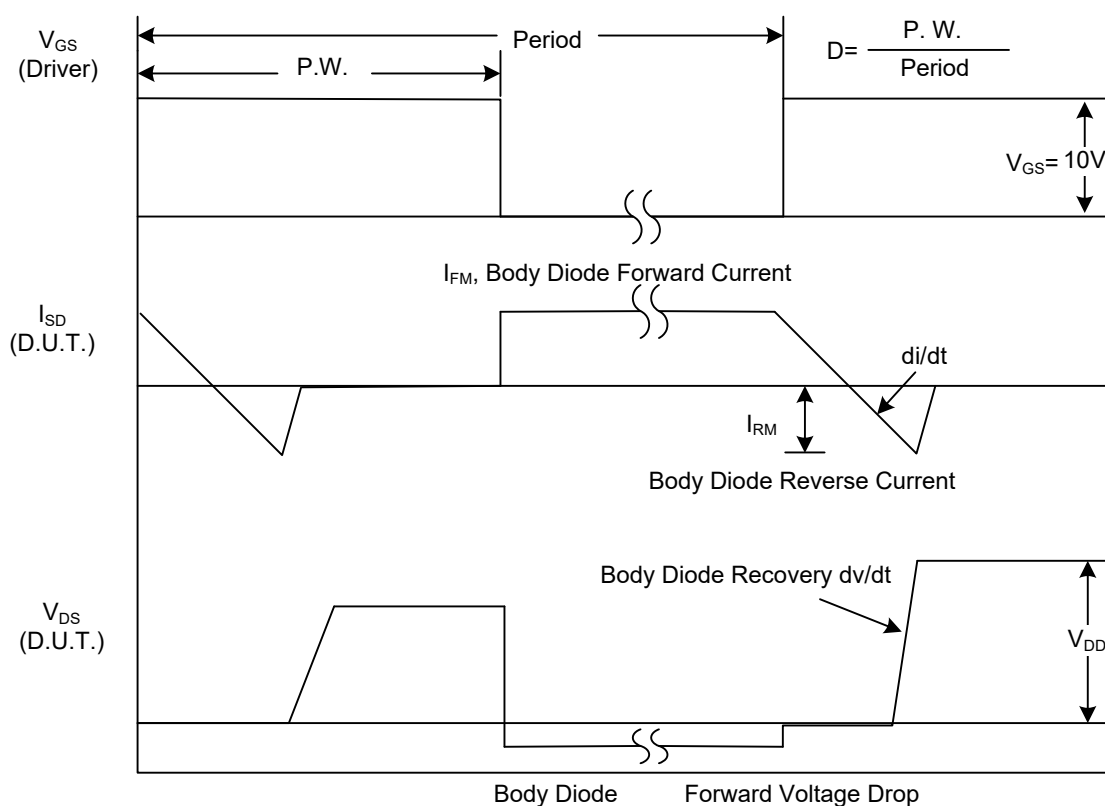
Notes: 1. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

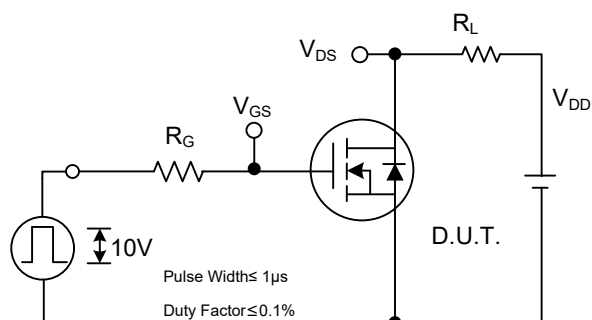


Peak Diode Recovery dv/dt Test Circuit

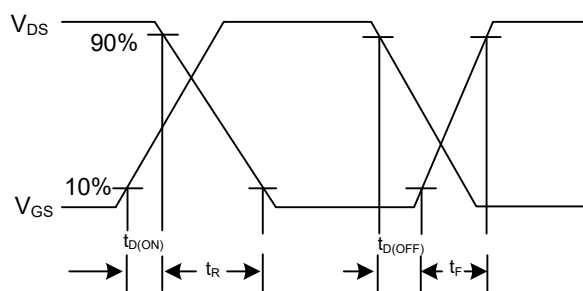


Peak Diode Recovery dv/dt Waveforms

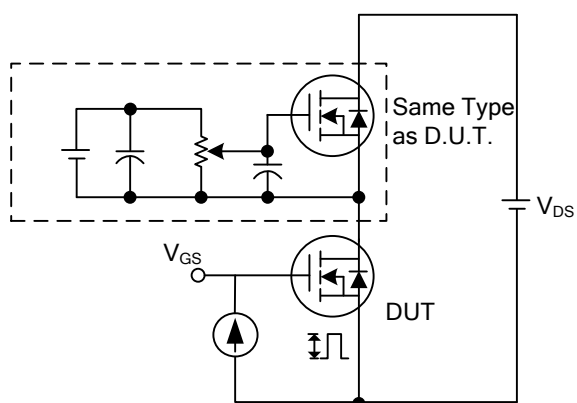
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



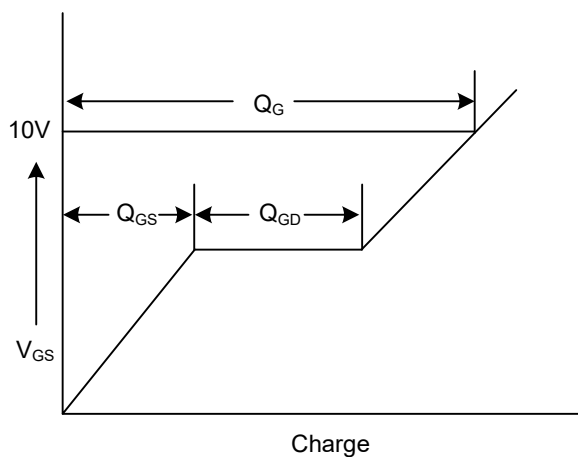
Switching Test Circuit



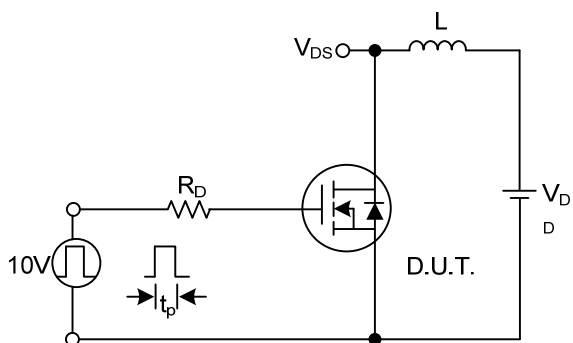
Switching Waveforms



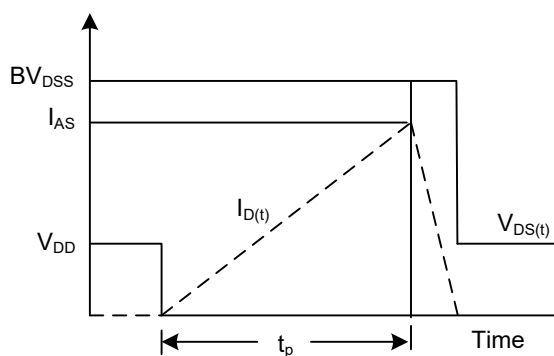
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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