



200A, 100V N-CHANNEL ENHANCEMENT MODE POWER MOSFET

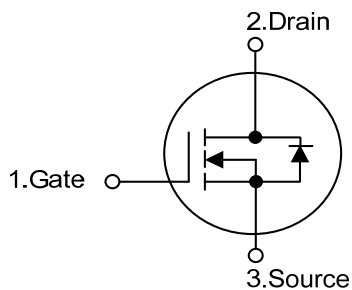
DESCRIPTION

The UTC **USGR026N10** is a uses Super Trench II technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g . This device is ideal for high-frequency switching and synchronous rectification.

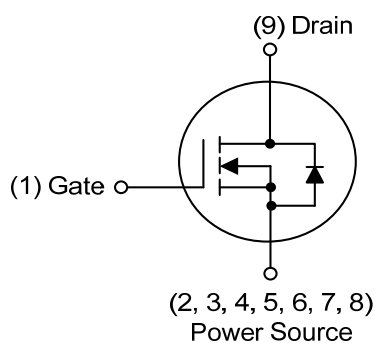
FEATURES

- * $R_{DS(ON)} \leq 2.6 \text{ m}\Omega$ @ $V_{GS}=10\text{V}$, $I_D=100\text{A}$
- * Excellent gate charge
- * High switching speed
- * Very low on-resistance $R_{DS(ON)}$
- * Low reverse transfer capacitance

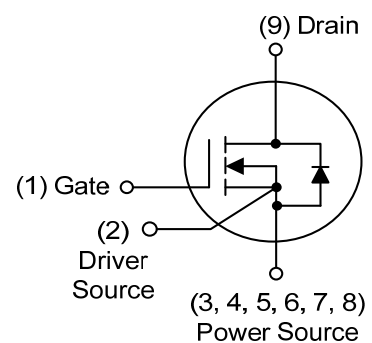
SYMBOL



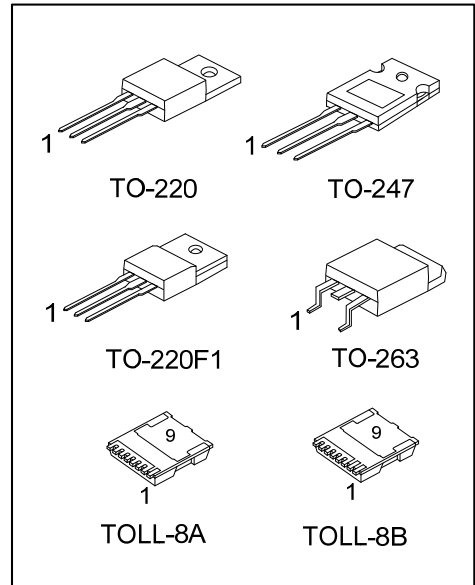
TO-220/TO-220F1
TO-247/TO-263



TOLL-8A



TOLL-8B



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment									Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	9	
USGR026N10L-TA3-T	USGR026N10G-TA3-T	TO-220	G	D	S	-	-	-	-	-	-	Tube
USGR026N10L-TF1-T	USGR026N10G-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	-	Tube
USGR026N10L-T47-T	USGR026N10G-T47-T	TO-247	G	D	S	-	-	-	-	-	-	Tube
USGR026N10L-TQ2-T	USGR026N10G-TQ2-T	TO-263	G	D	S	-	-	-	-	-	-	Tube
USGR026N10L-TQ2-R	USGR026N10G-TQ2-R	TO-263	G	D	S	-	-	-	-	-	-	Tape Reel
USGR026N10L-T8A-R	USGR026N10G-T8A-R	TOLL-8A	G	S	S	S	S	S	S	S	D	Tape Reel
USGR026N10L-T8B-R	USGR026N10G-T8B-R	TOLL-8B	G	S	S	S	S	S	S	S	D	Tape Reel

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

USGR026N10G-TA3-T (1) Packing Type (2) Package Type (3) Green Package	(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, T47: TO-247 TQ2: TO-263, T8A: TOLL-8A, T8B: TOLL-8B (3) G: Halogen Free and Lead Free, L: Lead Free
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■ MARKING

TO-220 / TO-263 / TO-247	TOLL-8A / TOLL-8B
UTC USGR026N10 Lot Code → 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9 → 10 → Date Code 1: Lot Code, 2: UTC, 3: USGR026N10, 4: L: Lead Free, 5: G: Halogen Free, 6: Date Code, 7: Date Code, 8: Date Code, 9: Date Code, 10: Date Code	UTC R026N10 Lot Code → 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9 → 10 → Date Code 1: Lot Code, 2: UTC, 3: R026N10, 4: L: Lead Free, 5: G: Halogen Free, 6: Date Code, 7: Date Code, 8: Date Code, 9: Date Code, 10: Date Code

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	100	V
Gate-Source Voltage		V_{GSS}	± 20	V
Drain Current	Continuous	I_D	200	A
	Pulsed (Note 2)	I_{DM}	400	A
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	135	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.67	V/ns
Power Dissipation	TO-220/TO-263	P_D	200	W
	TO-220F1		60	W
	TO-247		240	W
	TOLL-8A/TOLL-8B		450	W
Junction Temperature		T_J	+150	$^{\circ}\text{C}$
Storage Temperature Range		T_{STG}	-20 ~ +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. $L = 0.1\text{mH}$, $I_{AS} = 52\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\ \Omega$, 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	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F1 TO-263	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
	TO-247		50	$^{\circ}\text{C}/\text{W}$
	TOLL-8A/TOLL-8B		40	$^{\circ}\text{C}/\text{W}$
Junction to Case	TO-220/TO-263	θ_{JC}	0.625	$^{\circ}\text{C}/\text{W}$
	TO-220F1		2.08	$^{\circ}\text{C}/\text{W}$
	TO-247		0.52	$^{\circ}\text{C}/\text{W}$
	TOLL-8A/TOLL-8B		0.27(Note)	$^{\circ}\text{C}/\text{W}$

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

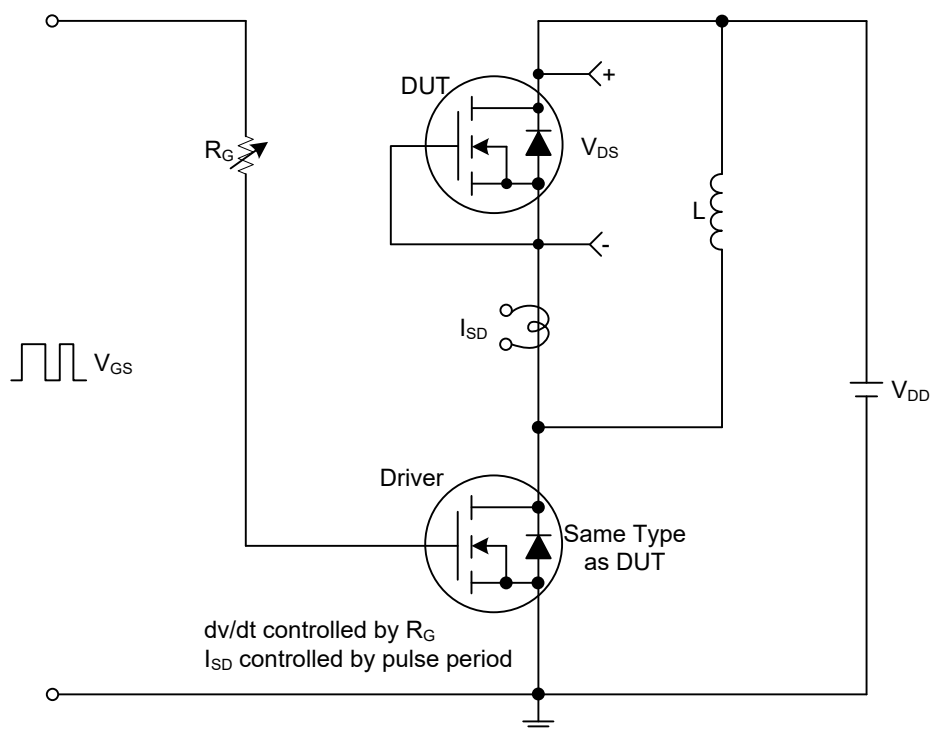
■ **ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V	100			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =100V, V _{GS} =0V			1	μA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{GS} =+20V, V _{DS} =0V			+100	nA
	Reverse		V _{GS} =-20V, 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 =100A		2.3	2.6	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		8550		pF
Output Capacitance		C _{OSS}			4300		pF
Reverse Transfer Capacitance		C _{RSS}			250		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =80V, V _{GS} =10V, I _D =200A, (Note 1, 2)		155		nC
Gate to Source Charge		Q _{GS}			48		nC
Gate to Drain Charge		Q _{GD}			40		nC
Turn-on Delay Time (Note 1)		t _{D(ON)}	V _{DD} =50V, V _{GS} =10V, I _D =200A, R _G =3.3Ω (Note 1, 2)		25		ns
Rise Time		t _R			29		ns
Turn-off Delay Time		t _{D(OFF)}			90		ns
Fall-Time		t _F			42		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				200	A
Maximum Body-Diode Pulsed Current		I _{SM}				400	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _S =200A, V _{GS} =0V			1.4	V
Reverse Recovery Time (Note 1)		t _{rr}	I _S =30A, V _{GS} =0V,		76		nS
Reverse Recovery Charge		Q _{rr}	dl _F /dt =100A/μs		170		nC

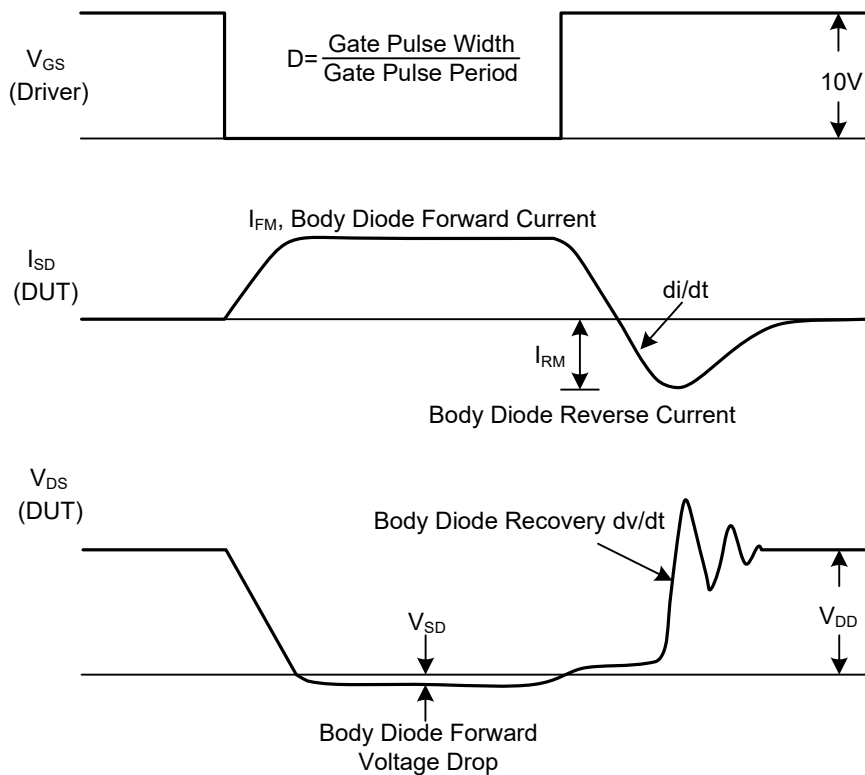
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS



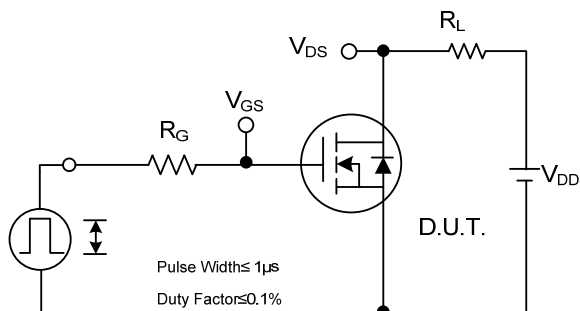
Peak Diode Recovery dv/dt Test Circuit



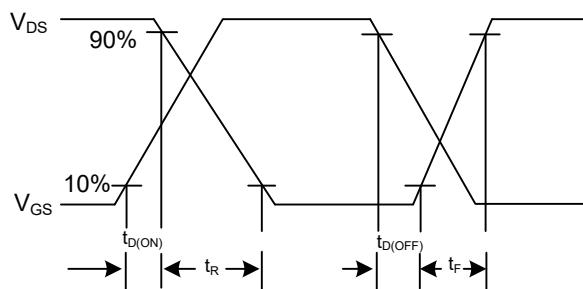
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

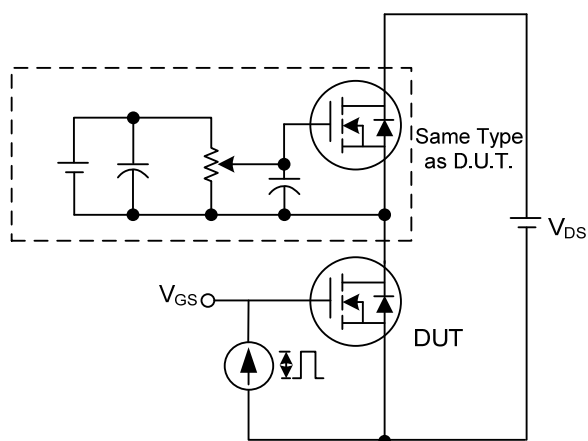
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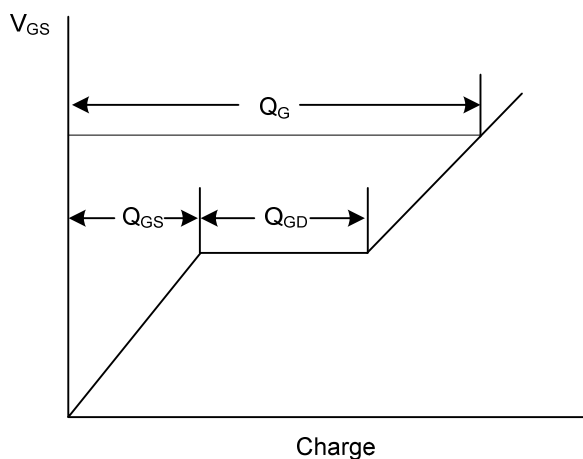
Switching Test Circuit



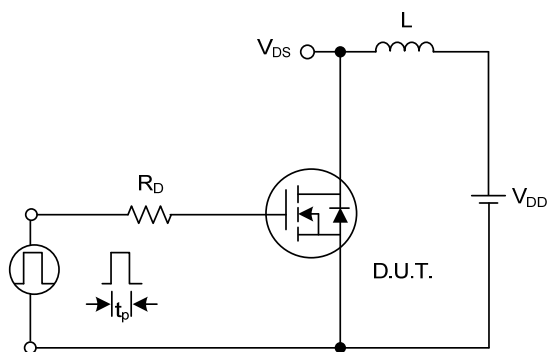
Switching Waveforms



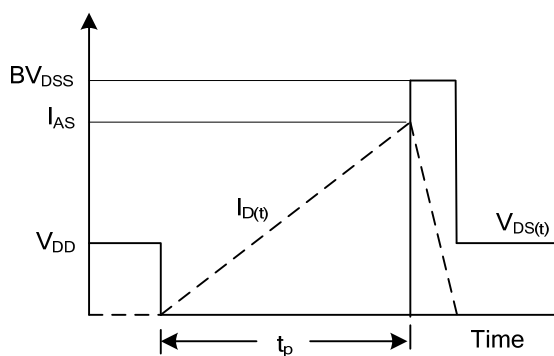
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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