



USG06R026M

Power MOSFET

N-CHANNEL SGT ENHANCEMENT POWER MOSFET

DESCRIPTION

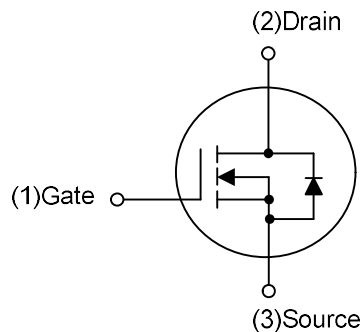
The UTC **USG06R026M** is a N-channel Power MOSFET, it uses UTC's advanced technology to provide the customers with high switching speed and low gate charge, etc.

The UTC **USG06R026M** applies to primary side switch, synchronous rectifier, Motor Drives, etc.

FEATURES

- * $R_{DS(ON)} \leq 2.6 \text{ m}\Omega$ @ $V_{GS} = 10V$, $I_D = 50A$
- * $R_{DS(ON)} \leq 3.8 \text{ m}\Omega$ @ $V_{GS} = 4.5V$, $I_D = 50A$
- * High Cell Density Trench Technology
- * High Power and Current Handling Capability
- * Green Product

SYMBOL

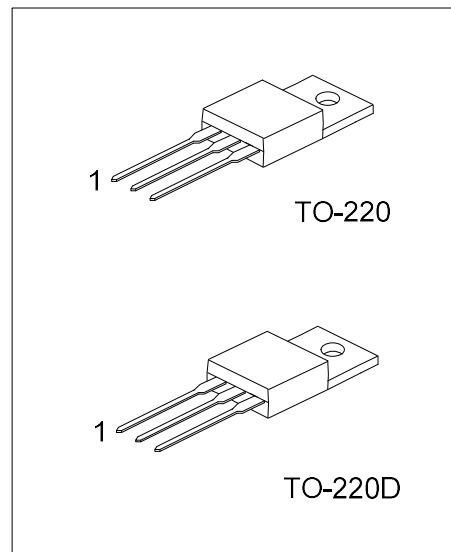


ORDERING INFORMATION

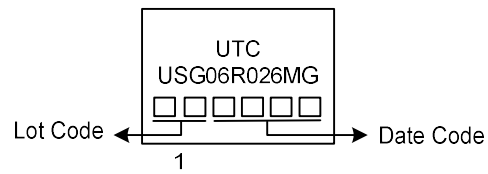
Ordering Number	Package	Pin Assignment			Packing
		1	2	3	
USG06R026MG-TA3-T	TO-220	G	D	S	Tube
USG06R026MG-TAD-T	TO-220D	G	D	S	Tube

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

USG06R026MG-TA3-T	(1)Packing Type	(1) T: Tube
	(2)Package Type	(2) TA3: TO-220, TAD: TO-220D
	(3)Green Package	(3) G: Halogen Free and Lead Free



■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V _{DSS}	60	V
Gate-Source Voltage		V _{GSS}	±20	V
Drain Current	Continuous	I _D	120	A
	Pulsed (Note 2)	I _{DM}	240	A
Single Pulsed Avalanche Energy (Note 3)		E _{AS}	186	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.16	V/ns
Power Dissipation		P _D	180	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 = 0.1mH, I_{AS} = 61A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C

4. I_{SD} ≤ 30A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, T_J ≤ T_{JMAX}, T_J = 25°C.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		θ _{JA}	62.5	°C/W
Junction to Case (Note)		θ _{JC}	0.69	°C/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}	I _D =250μA, V _{GS} =0V	60			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =60V, 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	1.0		2.5	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =50A			2.6	mΩ
			V _{GS} =4.5V, I _D =50A			3.8	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz		6829		pF
Output Capacitance		C _{OSS}			1780		pF
Reverse Transfer Capacitance		C _{RSS}			453		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{DS} =48V, V _{GS} =4.5V, I _D =120A		107		nC
		Q _G			183		nC
Gate to Source Charge		Q _{GS}	V _{DS} =48V, V _{GS} =10V, I _D =120A		18		nC
Gate to Drain Charge		Q _{GD}			65		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DD} =30V, V _{GS} =10V, I _D =120A, R _G =3Ω		17		ns
Rise Time		t _R			21		ns
Turn-OFF Delay Time		t _{D(OFF)}			101		ns
Fall-Time		t _F			53		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				120	A
Drain-Source Diode Forward Voltage		V _{SD}	I _F =120A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time		t _{rr}	I _S =30A, dI/dt=100A/μs		85		ns
Body Diode Reverse Recovery Charge		Q _{rr}			147		nC

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

D.U.T.

V_{DS}

I_{SD}

L

R_G

Driver

V_{GS}

Same Type as D.U.T.

V_{DD}

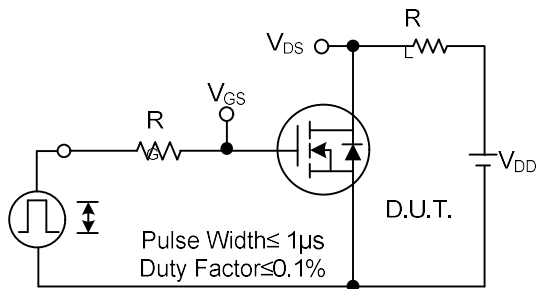
- * dv/dt controlled by R_G
- * I_{SD} controlled by pulse period
- * D.U.T.-Device Under Test

The diagram consists of three vertically aligned waveforms sharing a common time axis:

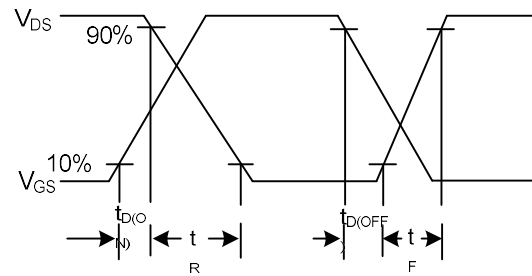
- Top Trace (V_{GS} (Driver)):** A square wave pulse. The pulse width is labeled $D = \frac{\text{Gate Pulse Width}}{\text{Gate Pulse Period}}$. The pulse height is $10V$.
- Middle Trace (I_{SD} (DUT)):** Shows the drain current. During the MOSFET on-state, it is a constant I_{FM} (Body Diode Forward Current). When the MOSFET turns off, the current reverses to I_{RM} (Body Diode Reverse Current). The reverse recovery is characterized by a di/dt slope.
- Bottom Trace (V_{DS} (DUT)):** Shows the drain-source voltage. It is zero during the MOSFET on-state. When the MOSFET turns off, it rises to V_{DD} . The initial rise is labeled "Body Diode Recovery dv/dt ". The voltage drop across the body diode during conduction is V_{SD} (Body Diode Forward Voltage Drop).

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Ver.A

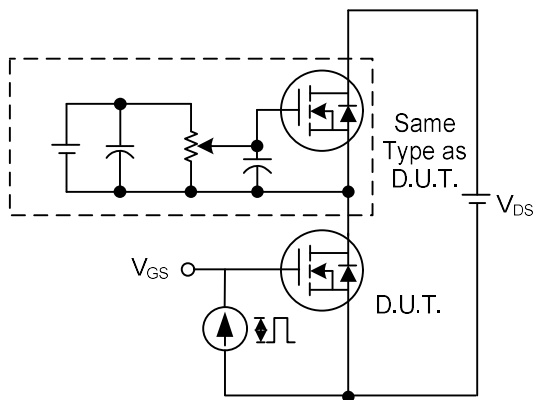
■ TEST CIRCUITS AND WAVEFORMS



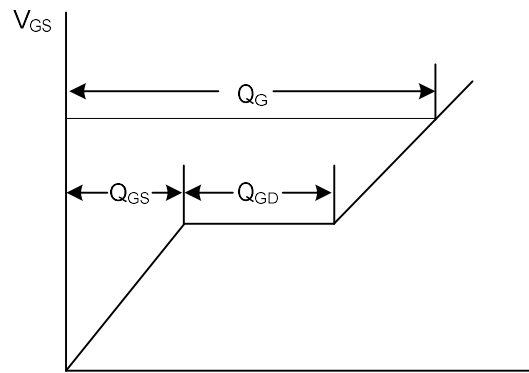
Switching Test Circuit



Switching Waveforms

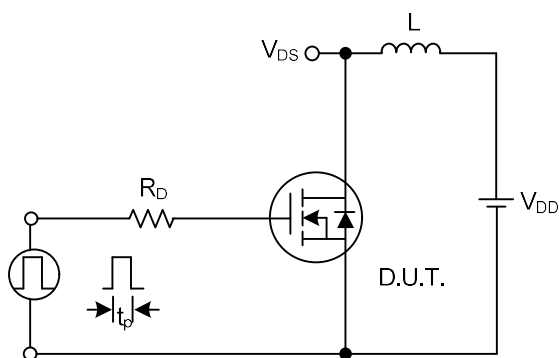


Gate Charge Test Circuit

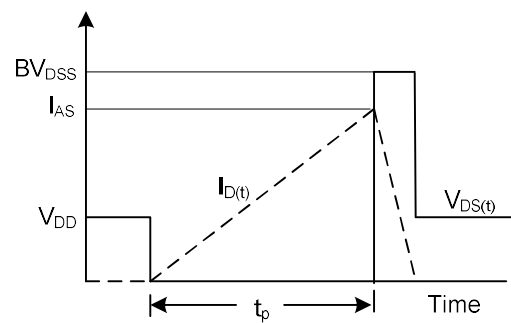


Charge

Gate Charge Waveform

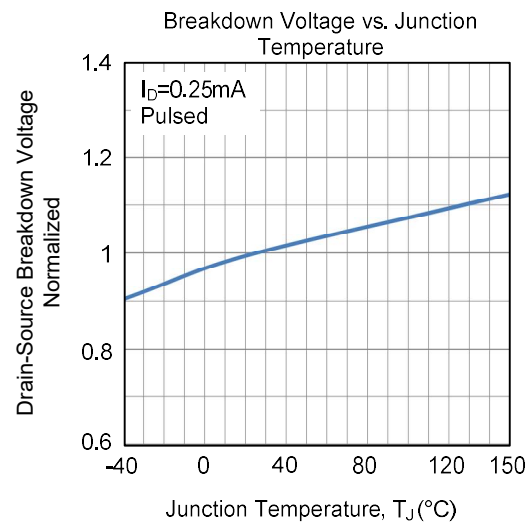
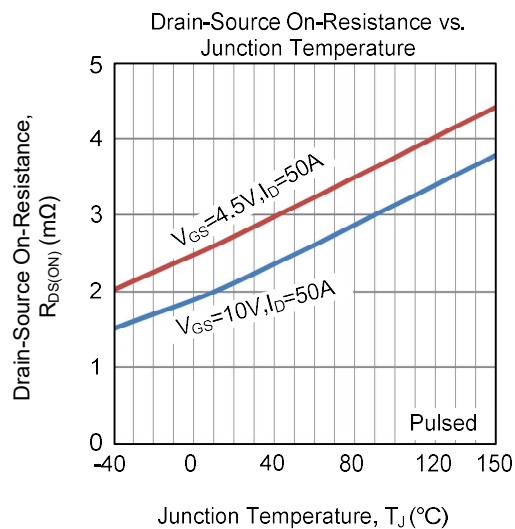
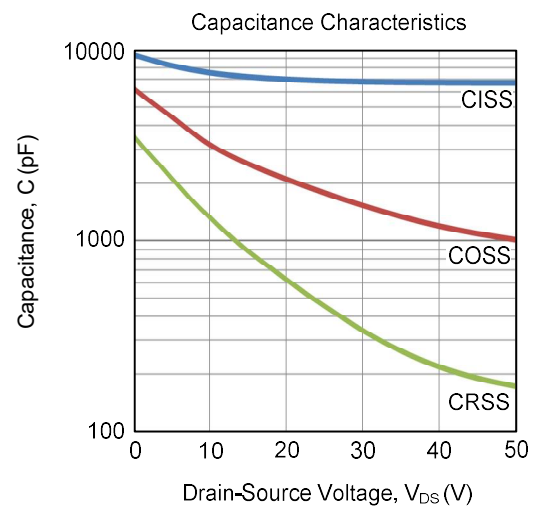
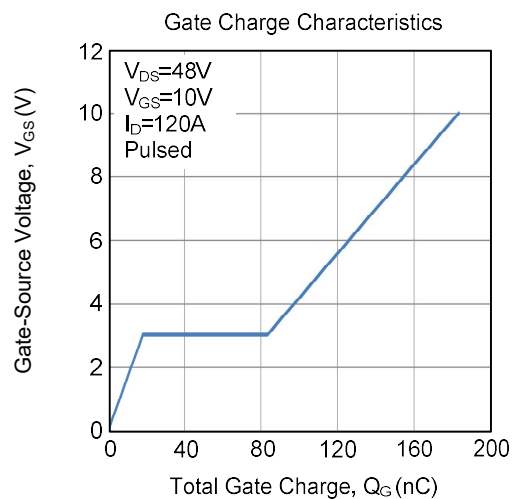
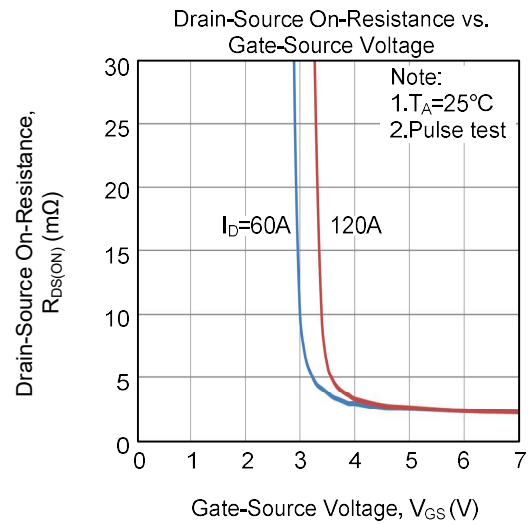
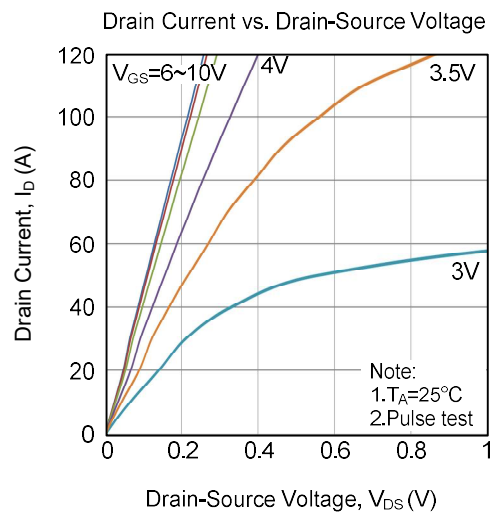


Unclamped Inductive Switching Test Circuit

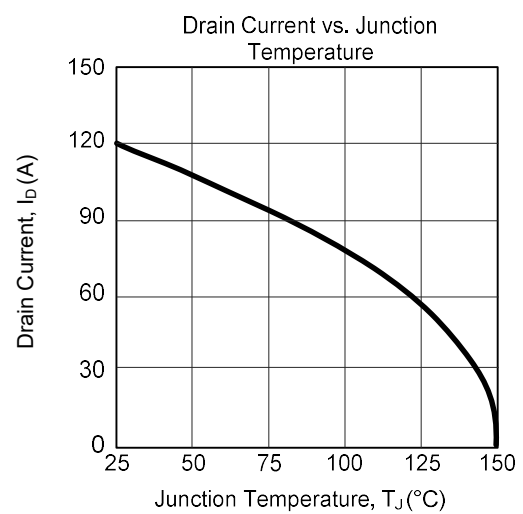
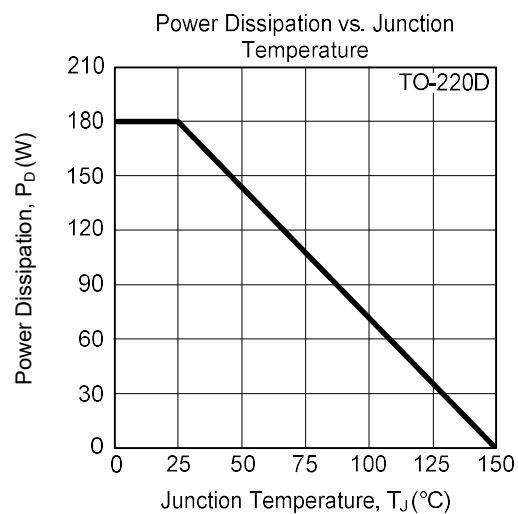
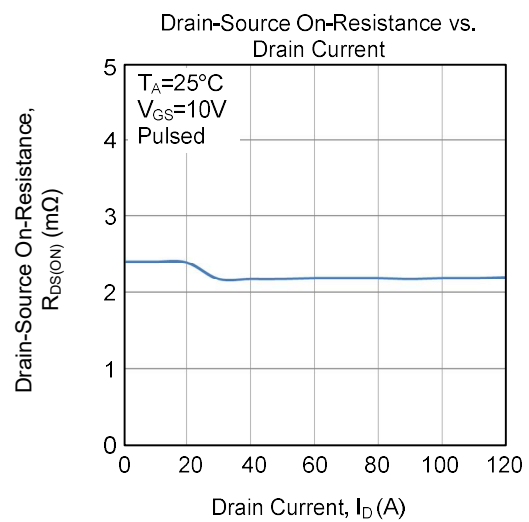
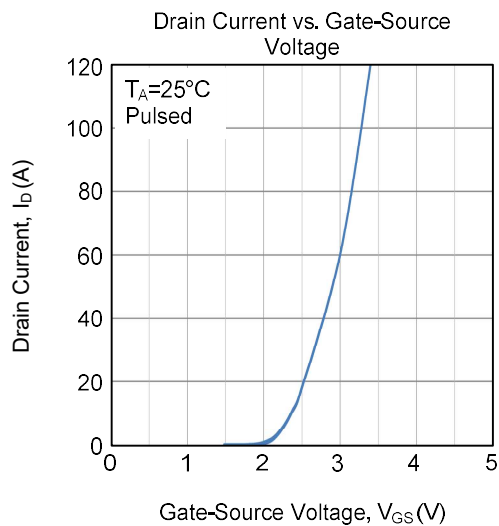
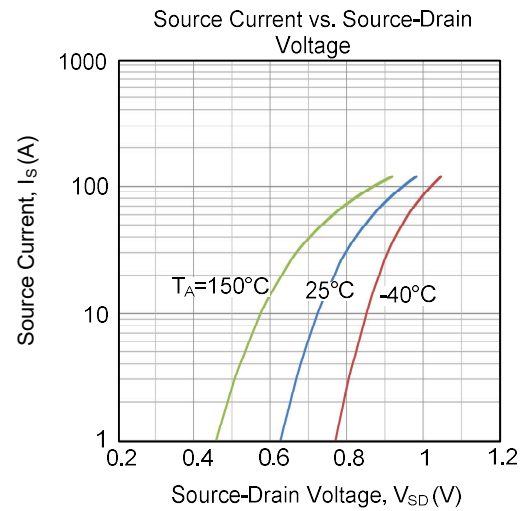
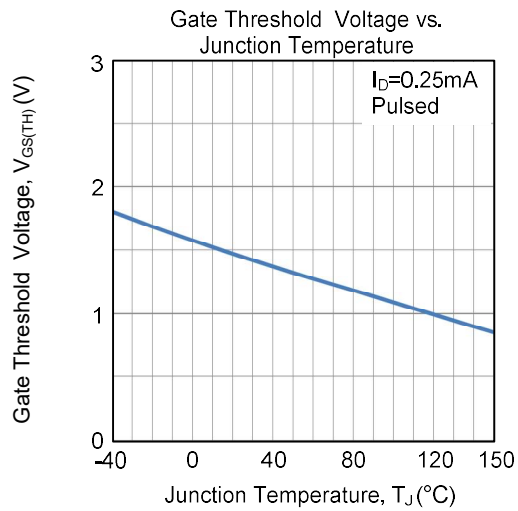


Unclamped Inductive Switching Waveforms

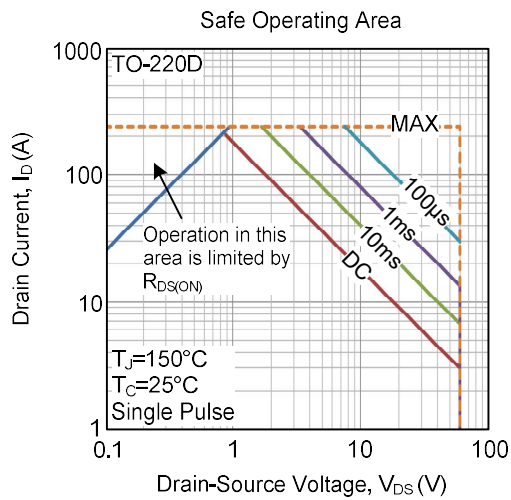
■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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