

**USG10R080M-T**

Preliminary

POWER MOSFET**100A, 100V N-CHANNEL
POWER MOSFET****DESCRIPTION**

The UTC **USG10R080M-T** is a N-channel Power MOSFET, it uses UTC's advanced technology to provide the customers with low $R_{DS(ON)}$ characteristic by high cell density trench technology.

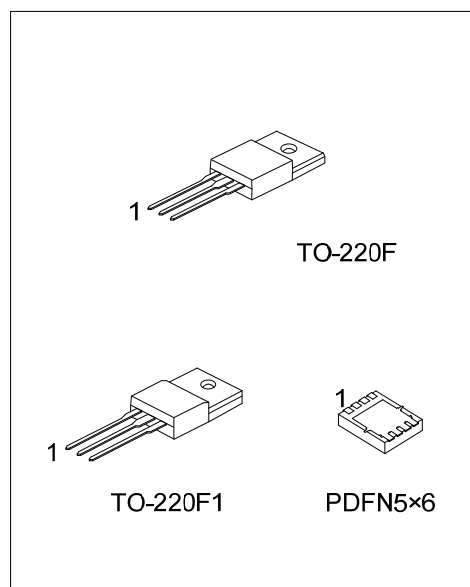
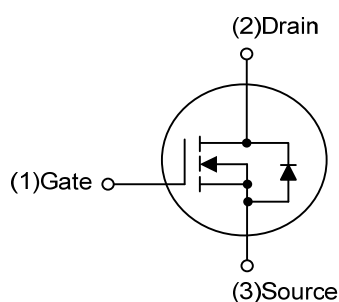
The UTC **USG10R080M-T** is suitable for high efficiency synchronous rectification in SMPS, UPS, hard switched and high frequency circuits.

FEATURES

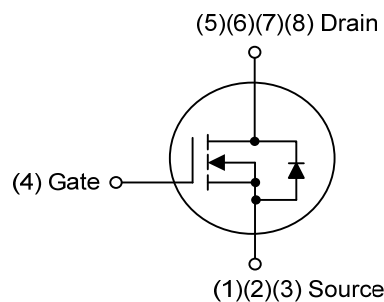
* $R_{DS(ON)} \leq 8.0 \text{ m}\Omega$ @ $V_{GS}=10\text{V}$, $I_D=30\text{A}$

$R_{DS(ON)} \leq 10 \text{ m}\Omega$ @ $V_{GS}=4.5\text{V}$, $I_D=20\text{A}$

* High Switching Speed

**SYMBOL**

TO-220F / TO-220F1



PDFN5x6

ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
USG10R080ML-TF1-T	USG10R080MG-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	Tube
USG10R080ML-TF3-T	USG10R080MG-TF3-T	TO-220F	G	D	S	-	-	-	-	-	Tube
USG10R080ML-P5060-R	USG10R080MG-P5060-R	PDFN5x6	S	S	S	G	D	D	D	D	Tape Reel

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

USG10R080MG-TF1-T (1) Packing Type (2) Package Type (3) Green Package	(1) T: Tube, R: Tape Reel (2) TF1: TO-220F1, TF3: TO-220F, P5060: PDFN5×6 (3) G: Halogen Free and Lead Free, L: Lead Free
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MARKING

TO-220F / TO-220F1	PDFN5×6
UTC USG10R080M Lot Code ← [][] [][] → Date Code 1 L: Lead Free G: Halogen Free	UTC USG 10R080M Lot Code ← []•[][][][][] → Date Code

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	± 20	V
Drain Current	Continuous	I_D	100	A
	Pulsed (Note 2)	I_{DM}	200	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	49	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.5	V/ns
Power Dissipation	TO-220F/TO-220F1	P_D	32	W
	PDFN5×6		46	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. $L = 0.1\text{mH}$, $I_{AS} = 31.3\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, 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-220F/TO-220F1	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
	PDFN5×6		65	$^{\circ}\text{C}/\text{W}$
Junction to Case	TO-220F/TO-220F1	θ_{JC}	3.9	$^{\circ}\text{C}/\text{W}$
	PDFN5×6		2.71 (Note)	$^{\circ}\text{C}/\text{W}$

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

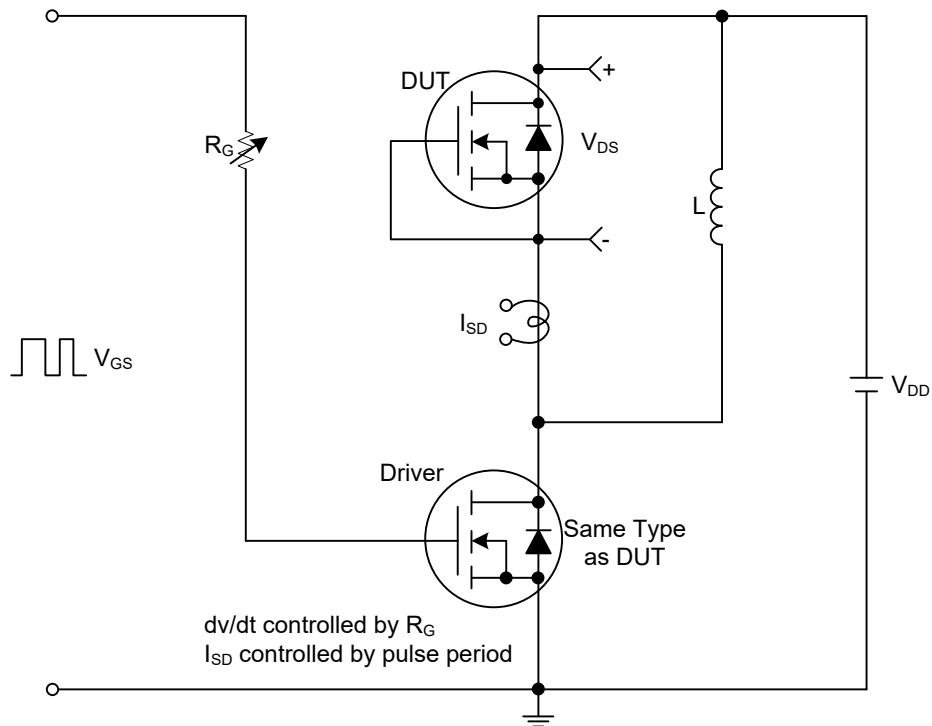
■ **ELECTRICAL CHARACTERISTICS** ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250μA	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	1.1		2.4	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =30A		6.2	8.0	mΩ
			V _{GS} =4.5V, I _D =20A		8.0	10	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		2650		nF
Output Capacitance		C _{OSS}			1380		pF
Reverse Transfer Capacitance		C _{RSS}			53		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{DS} =80V, V _{GS} =10V, I _D =100A (Note 2))		61		nC
Gate to Source Charge		Q _{GS}			9		nC
Gate to Drain Charge		Q _{GD}			12		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DD} =50V, V _{GS} =10V, I _D =100A, R _G =3Ω, (Note 2)		11		ns
Rise Time		t _R			18		ns
Turn-OFF Delay Time		t _{D(OFF)}			36		ns
Fall-Time		t _F			20		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I _S				100	A
Maximum Pulsed Drain-Source Diode Forward Current		I _{SM}				200	A
Drain-Source Diode Forward Voltage		V _{SD}	I _S =100A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time		t _{rr}	I _F =30A,V _{GS} =0V, di/dt=100A/μs		160		ns
Body Diode Reverse Recovery Charge		Q _{rr}			316		nC

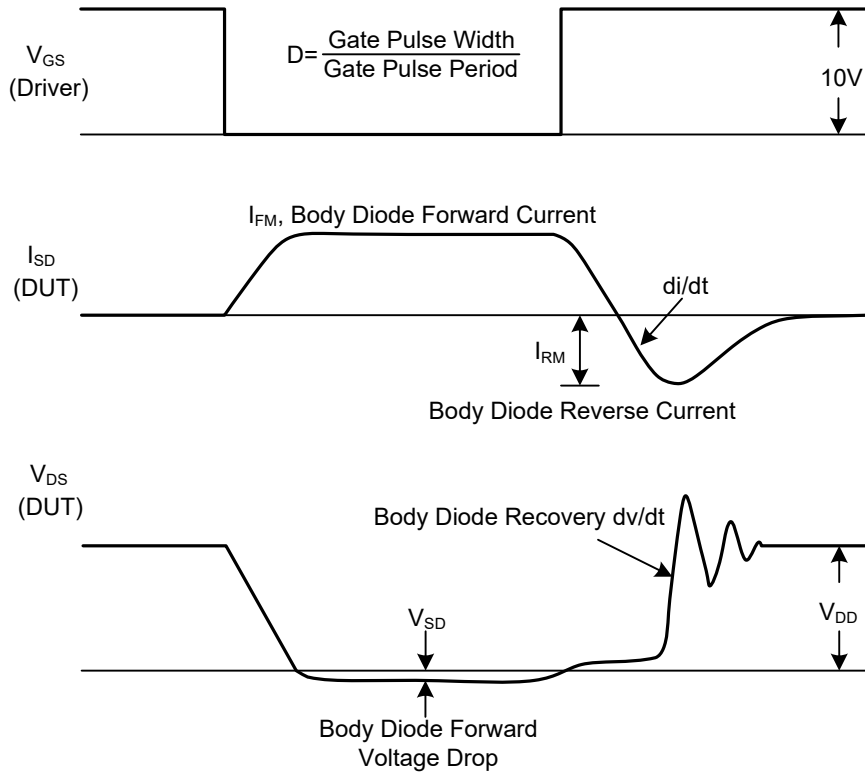
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS



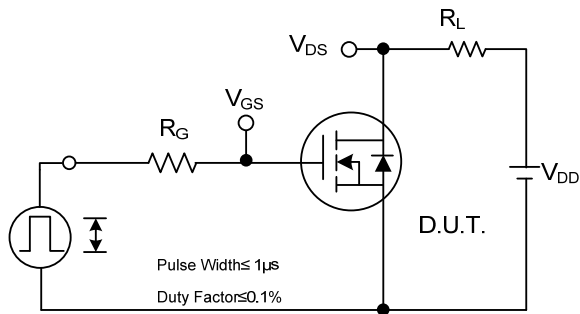
Peak Diode Recovery dv/dt Test Circuit



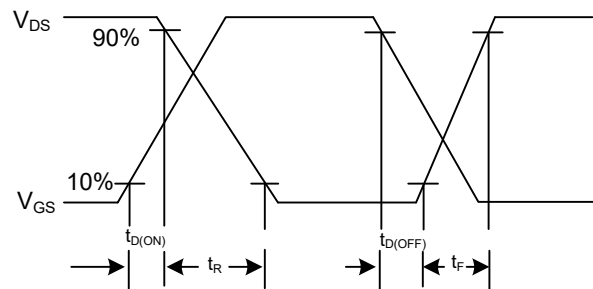
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

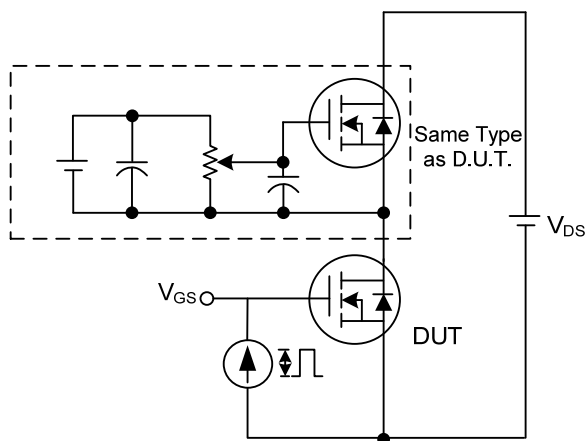
■ TEST CIRCUITS AND WAVEFORMS



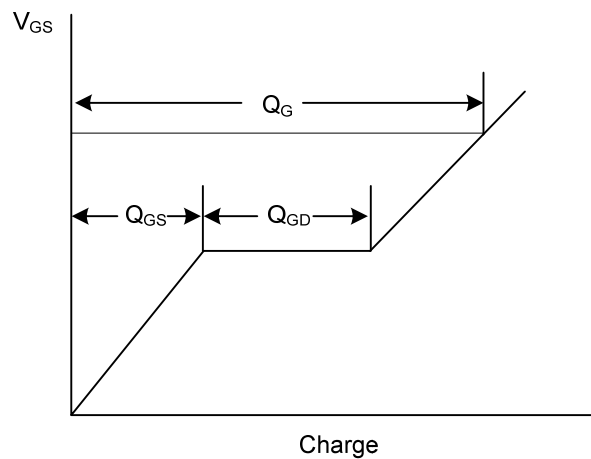
Switching Test Circuit



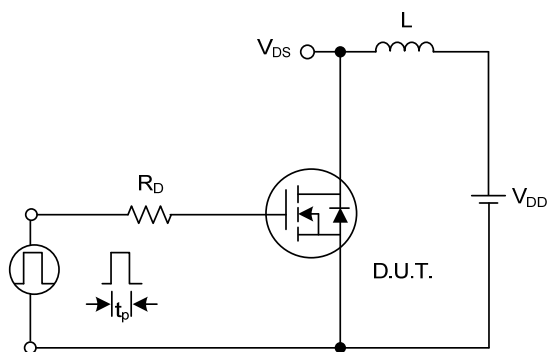
Switching Waveforms



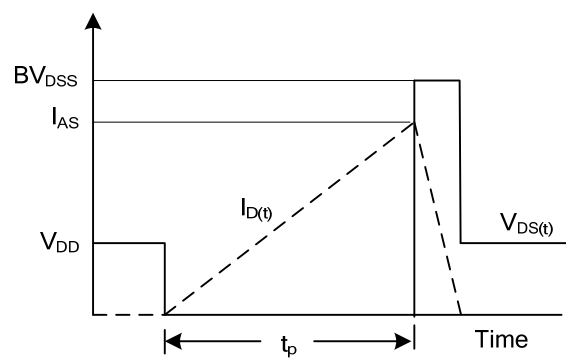
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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