

**UT23N15M**

Preliminary

POWER MOSFET**23A, 150V N-CHANNEL
POWER MOSFET****DESCRIPTION**

The UTC **UT23N15M** 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.

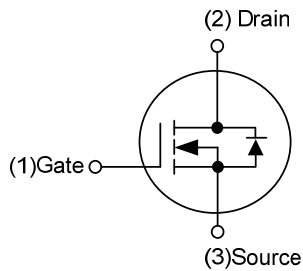
The UTC **UT23N15M** is suitable for high efficiency synchronous rectification in SMPS, UPS, hard switched and high frequency circuits.

FEATURES

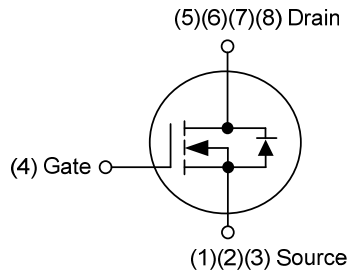
* $R_{DS(ON)} \leq 60 \text{ m}\Omega$ @ $V_{GS}=10\text{V}$, $I_D=11.5\text{A}$

$R_{DS(ON)} \leq 70 \text{ m}\Omega$ @ $V_{GS}=4.5\text{V}$, $I_D=8.0\text{A}$

* High Switching Speed

SYMBOL

SOT-223 / TO-252



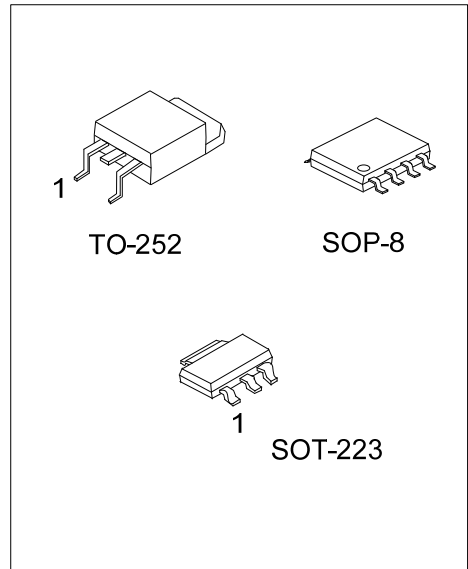
SOP-8

ORDERING INFORMATION

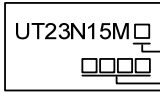
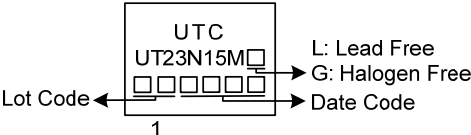
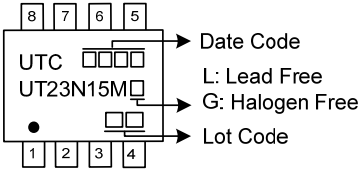
Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT23N15ML-AA3-R	UT23N15MG-AA3-R	SOT-223	G	D	S	-	-	-	-	-	Tape Reel
UT23N15ML-TN3-R	UT23N15MG-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UT23N15ML-S08-R	UT23N15MG-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel

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

UT23N15MG-AA3-R		(1) Packing Type	(1) R: Tape Reel
		(2) Package Type	(2) AA3: SOT-223, TN3: TO-252, S08: SOP-8
		(3) Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free



■ MARKING

PACKAGE	MARKING
SOT-223	 UT23N15M □ □ □ □ □ 1 L: Lead Free G: Halogen Free Date Code
TO-252	 UTC UT23N15M □ □ □ □ □ □ □ 1 Lot Code ← L: Lead Free G: Halogen Free Date Code
SOP-8	 8 7 6 5 UTC □ □ □ □ UT23N15M □ ● □ □ □ 1 2 3 4 Date Code L: Lead Free G: Halogen Free Lot Code

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

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V _{DSS}	150	V
Gate-Source Voltage			V _{GSS}	±20	V
Drain Current	Continuous	TO-252	I _D	23	A
		SOT-223		11	A
	SOP-8				
	Pulsed (Note 2)		I _{DM}	46	A
Avalanche Energy	Single Pulsed (Note 3)		E _{AS}	252	mJ
Peak Diode Recovery dv/dt (Note 4)			dv/dt	4.6	V/ns
Power Dissipation	SOT-223		P _D	3	W
	TO-252			44	W
	SOP-8			2.5	W
Junction Temperature			T _J	+150	°C
Storage Temperature Range			T _{STG}	-20 ~ +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. $L = 30\text{mH}$, $I_{AS} = 4.1\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$

4. $I_{SD} \leq 23\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-223	θ_{JA}	104(Note)	$^{\circ}\text{C}/\text{W}$
	TO-252		110	$^{\circ}\text{C}/\text{W}$
	SOP-8		125 (Note)	$^{\circ}\text{C}/\text{W}$
Junction to Case	SOT-223	θ_{JC}	41.6 (Note)	$^{\circ}\text{C}/\text{W}$
	TO-252		2.84 (Note)	$^{\circ}\text{C}/\text{W}$
	SOP-8		50 (Note)	$^{\circ}\text{C}/\text{W}$

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

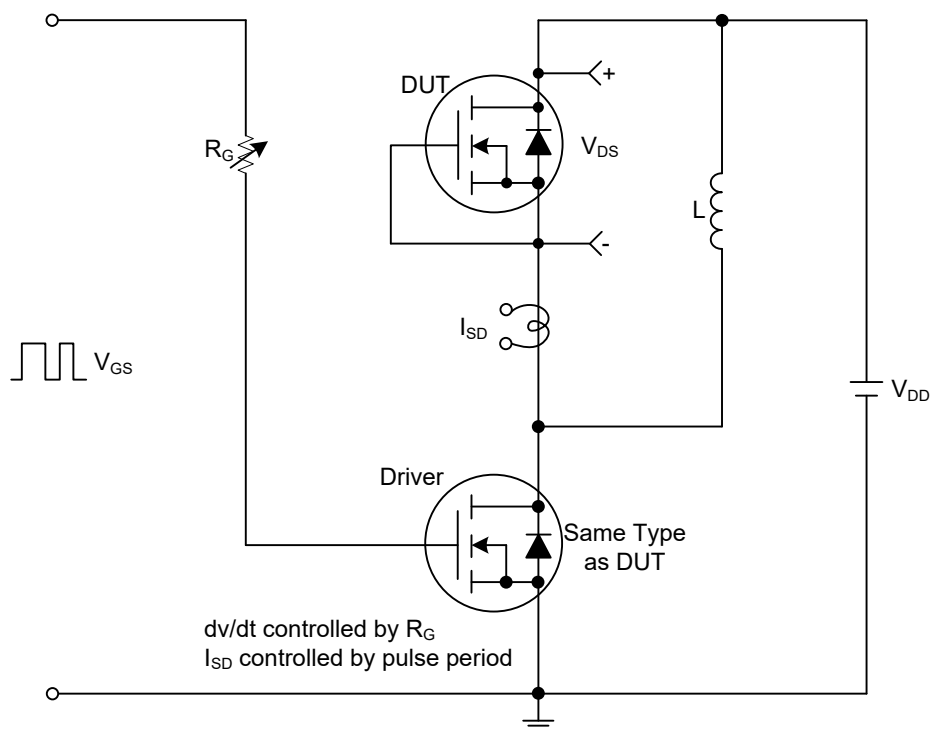
■ **ELECTRICAL CHARACTERISTICS** ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V	150			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =150V, 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		3.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =11.5A			60	mΩ
			V _{GS} =4.5V, I _D =8.0A			70	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		2660		pF
Output Capacitance		C _{OSS}			155		pF
Reverse Transfer Capacitance		C _{RSS}			130		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =120V, V _{GS} =10V, I _D =23A (Note 1, 2)		100		nC
Gate to Source Charge		Q _{GS}			13		nC
Gate to Drain Charge		Q _{GD}			35		nC
Turn-on Delay Time (Note 1)		t _{D(ON)}	V _{DD} =75V, V _{GS} =10V, I _D =23A, R _G =3.3Ω (Note 1, 2)		8		ns
Rise Time		t _R			18		ns
Turn-off Delay Time		t _{D(OFF)}			50		ns
Fall-Time		t _F			22		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				23	A
Maximum Body-Diode Pulsed Current		I _{SM}				46	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _S =23A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time		t _{RR}	V _{GS} =0V, dI _S /dI _t =100A/μs		90		ns
Body Diode Reverse Recovery Charge		Q _{RR}	I _S =23A		270		nC

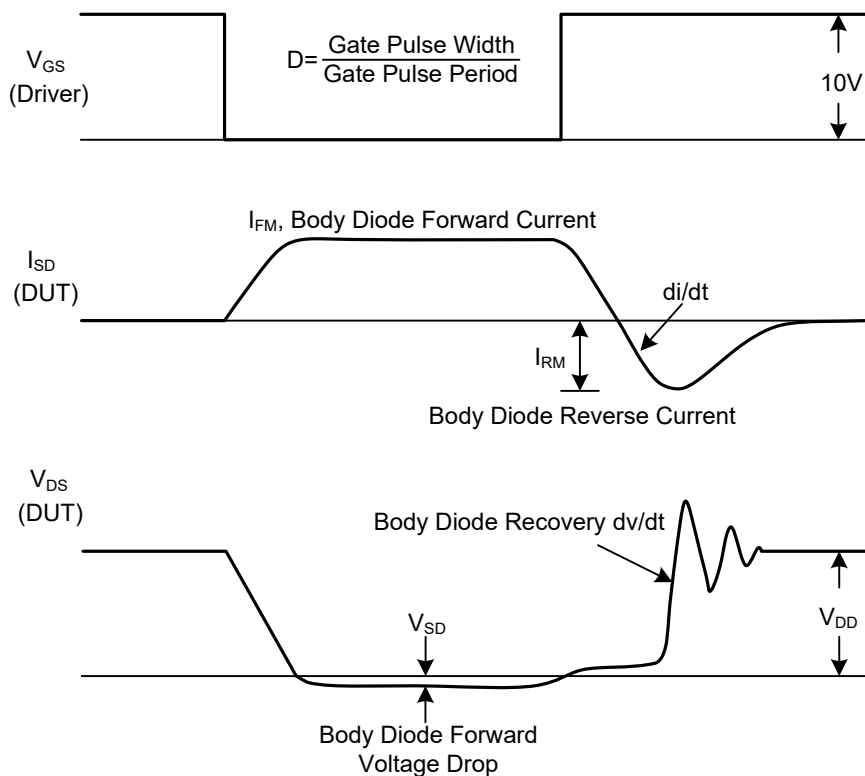
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS



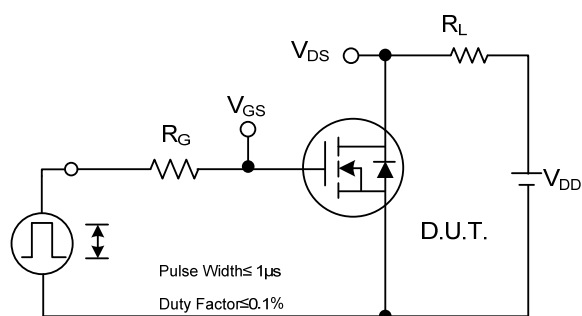
Peak Diode Recovery dv/dt Test Circuit



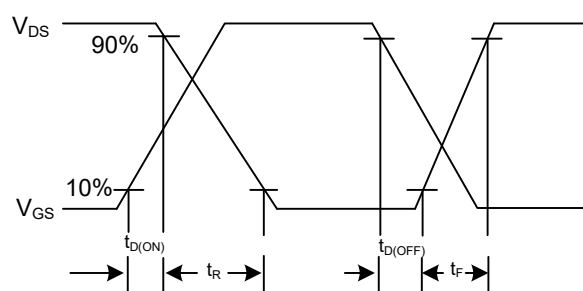
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

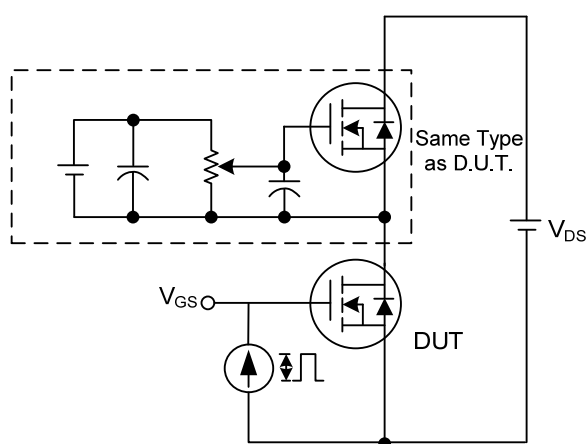
■ TEST CIRCUITS AND WAVEFORMS



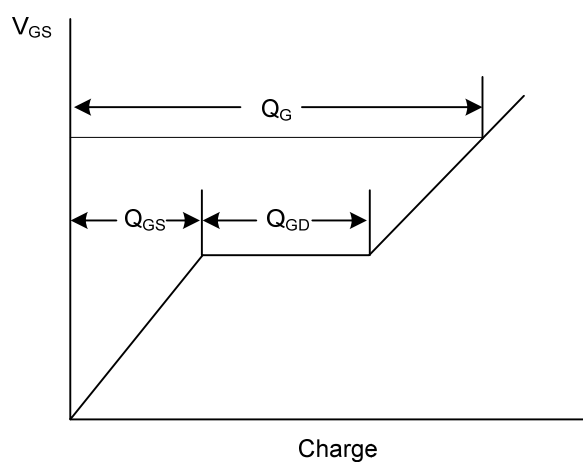
Switching Test Circuit



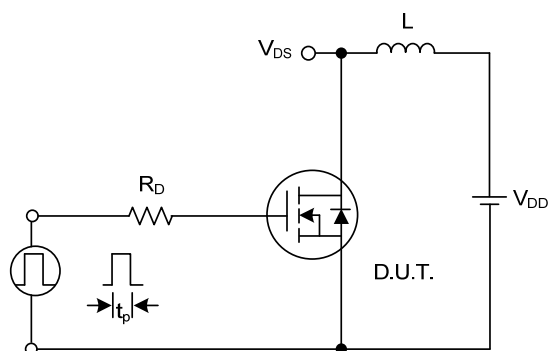
Switching Waveforms



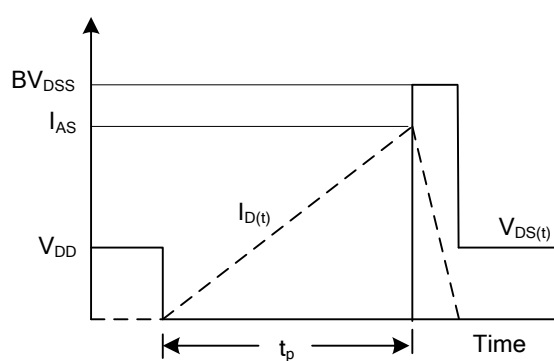
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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