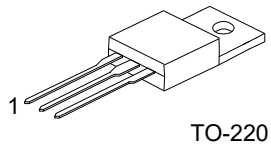
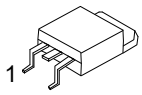
UTT120N04M

Preliminary | ***Power MOSFET***

120A, 40V N-CHANNEL POWER MOSFET



TO-220



TO - 252

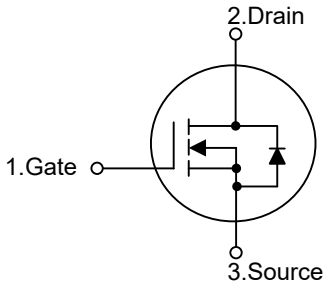
■ DESCRIPTION

The UTC **UTT120N04M** is an N-channel enhancement mode Power FET, it uses UTC's advanced technology to provide customers a minimum on-state resistance and high switching speed.

■ FEATURES

* $R_{DS(ON)} \leq 3.9\ m\Omega$ @ V_{GS}=10V, I_D=60A
  $R_{DS(ON)} \leq 7.8\ m\Omega$ @ V_{GS}=4.5V, I_D=60A
* High switching speed
* Improved dv/dt capability

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UTT120N04ML-TA3-T	UTT120N04MG-TA3-T	TO-220	G	D	S	Tube
UTT120N04ML-TN3-R	UTT120N04MG-TN3-R	TO-252	G	D	S	Tape Reel

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

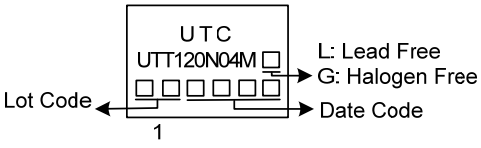
UTT120N04MG-TA3-T

(1)Packing Type — (1) T: Tube, R: Tape Reel

(2)Package Type — (2) TA3: TO-220, TN3: TO-252

(3)Green Package — (3) G: Halogen Free and Lead Free L: Lead Free

■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	40	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	Continuous	I_D	120	A
	Pulsed (Note 2)	I_{DM}	240	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	186	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.1	V/ns
Power Dissipation	TO-220	P_D	200	W
	TO-252		70	W
Junction Temperature		T_J	+150	°C
Storage Temperature Range		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}=25V, R_G=25Ω, Starting T_J = 25°C
4. I_{SD} ≤ 30A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220	θ_{JA}	62.5	°C/W
	TO-252		110	°C/W
Junction to Case	TO-220	θ_{JC}	0.62	°C/W
	TO-252		1.78 (Note)	°C/W

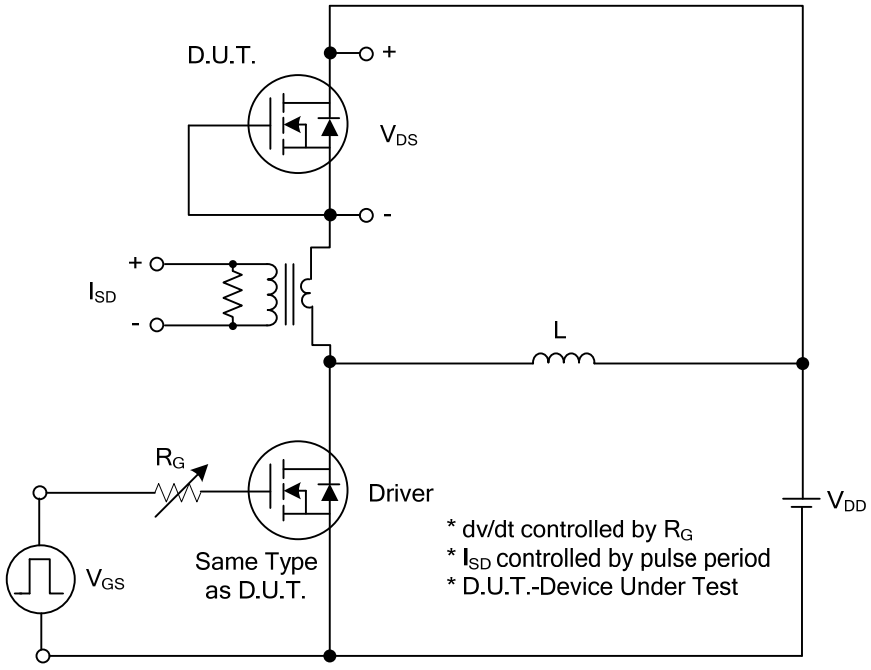
Note: Device mounted on FR-4 substrate P_C board, 2oz copper, with 1inch square copper plate.

■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

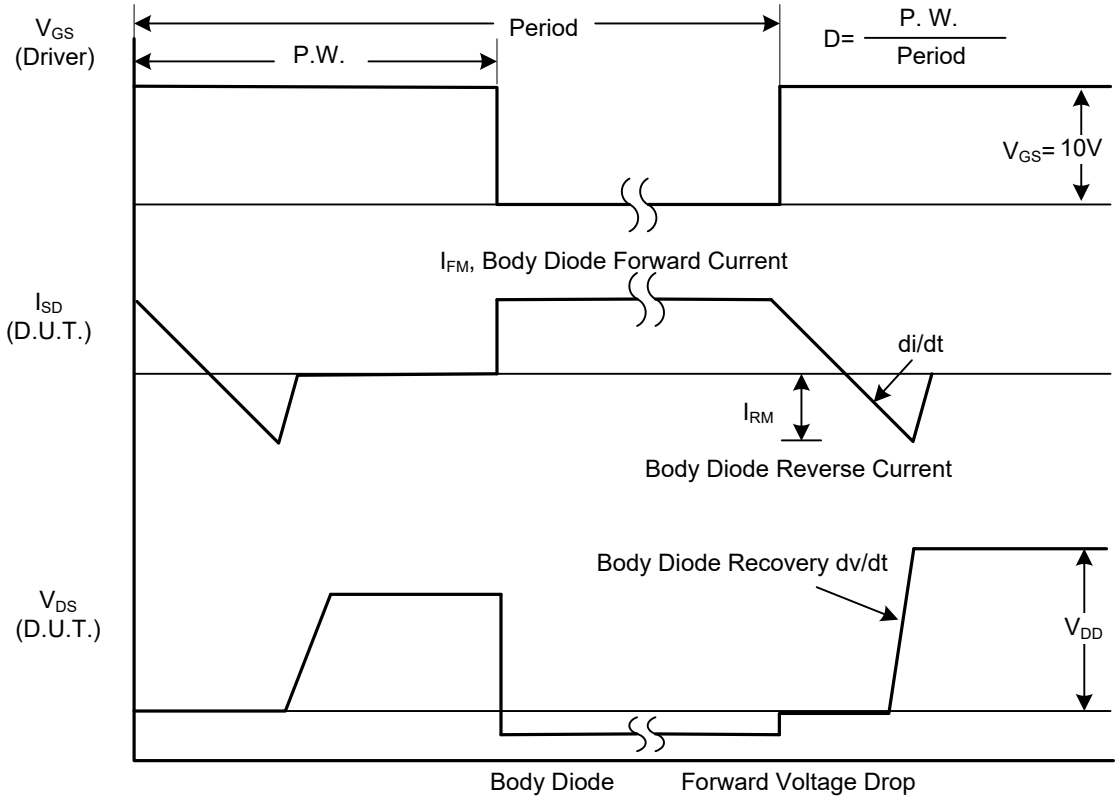
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	40			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=40V			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	I_D=250μA, V_{DS}=V_{GS}	1.0		3.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=60A			3.9	mΩ
			V_{GS}=4.5V, I_D=60A			7.8	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1MHz		5578		pF
Output Capacitance		C_{OSS}			800		pF
Reverse Transfer Capacitance		C_{RSS}			700		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{DD}=32V, V_{GS}=10V, I_D=120A, (Note 1, 2)		145		nC
Gate to Source Charge		Q_{GS}			50		nC
Gate to Drain Charge		Q_{GD}			46		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=20V, I_D=120A, R_G=3Ω, V_{GS}=10V (Note 1, 2)		15		ns
Rise Time		t_R			20		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			48		ns
Fall-Time		t_F			22		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				120	A
Maximum Body-Diode Pulsed Current		I_{SM}				240	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=120A			1.4	V
Reverse Recovery Time		t_{rr}	I_S =30A, V_{GS}=0V dI$_F$/dt=100A/μs		76		nS
Reverse Recovery Charge (Note 1)		Q_{rr}			140		nC

Notes: 1. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS

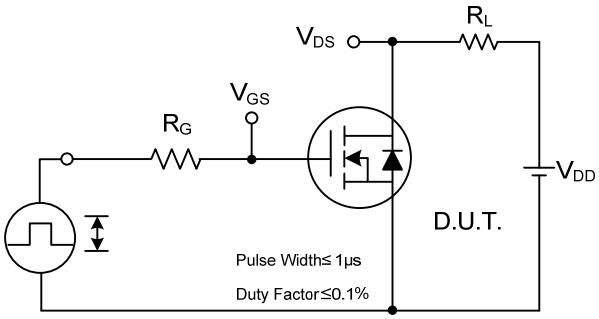


Peak Diode Recovery dv/dt Test Circuit

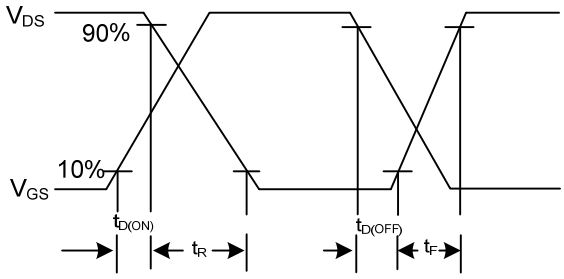


Peak Diode Recovery dv/dt Waveforms

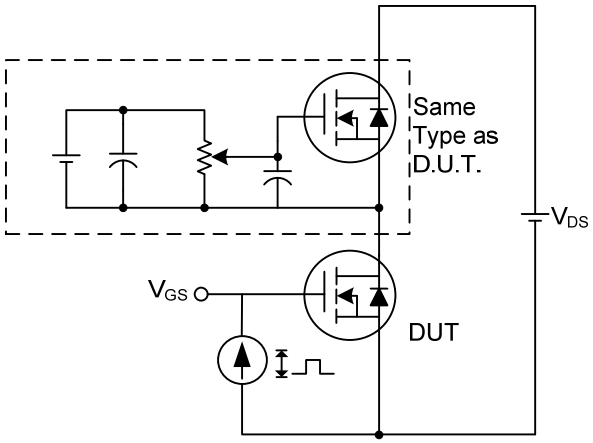
■ TEST CIRCUITS AND WAVEFORMS



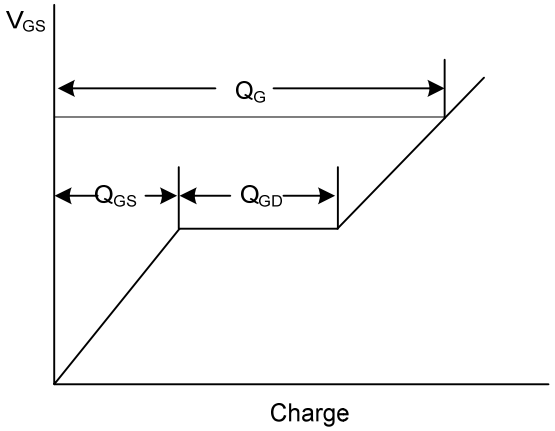
Switching Test Circuit



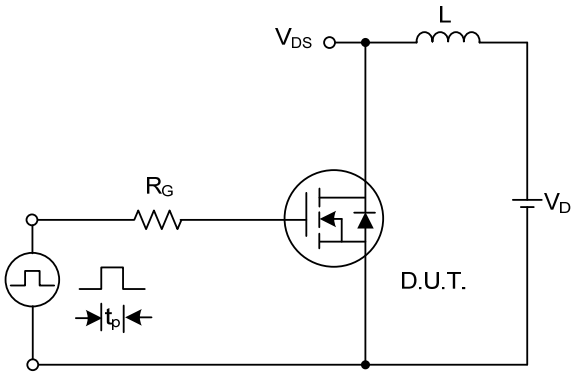
Switching Waveforms



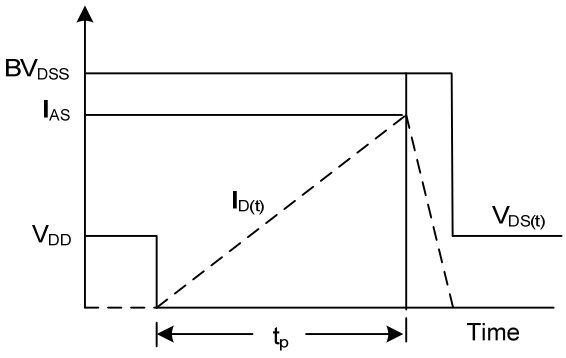
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms