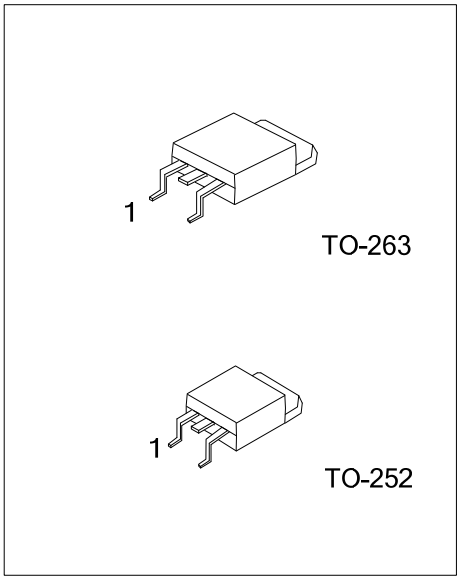
120A, 40V N-CHANNEL POWER MOSFET



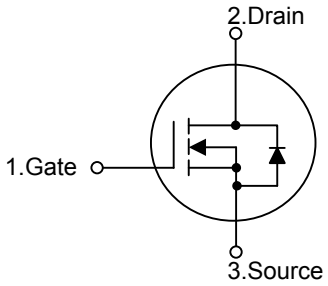
■ DESCRIPTION

The UTC **UT120N04H** 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

* $R_{DS(ON)} \leq 4.0\ m\Omega$ @ V_{GS}=10V, I_D=60A
* High switching speed
* Improved dv/dt capability

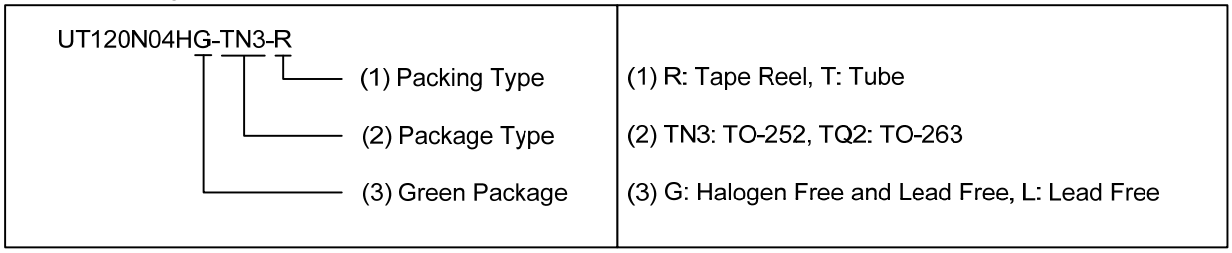
■ SYMBOL



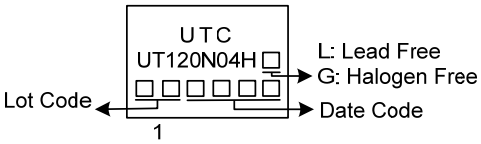
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UT120N04HL-TN3-R	UT120N04HG-TN3-R	TO-252	G	D	S	Tape Reel
UT120N04HL-TQ2-T	UT120N04HG-TQ2-T	TO-263	G	D	S	Tube
UT120N04HL-TQ2-R	UT120N04HG-TQ2-R	TO-263	G	D	S	Tape Reel

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



■ 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	I_{DM}	240	A
Avalanche Energy	Single Pulsed	E_{AS}	300	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.9	V/ns
Power Dissipation	TO-252	P_D	56	W
	TO-263		100	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} = 77.5A, V_{DD} = 30V, 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	RATINGS	UNIT
Junction to Ambient	TO-252	θ_{JA}	110	°C/W
	TO-263		62.5	°C/W
Junction to Case	TO-252	θ_{JC}	2.23	°C/W
	TO-263		1.25	°C/W

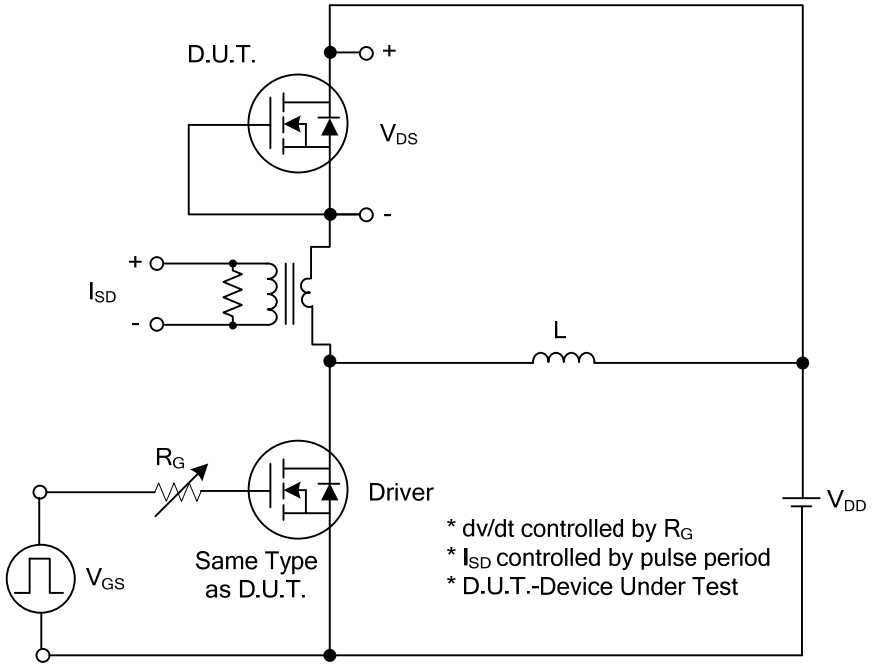
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

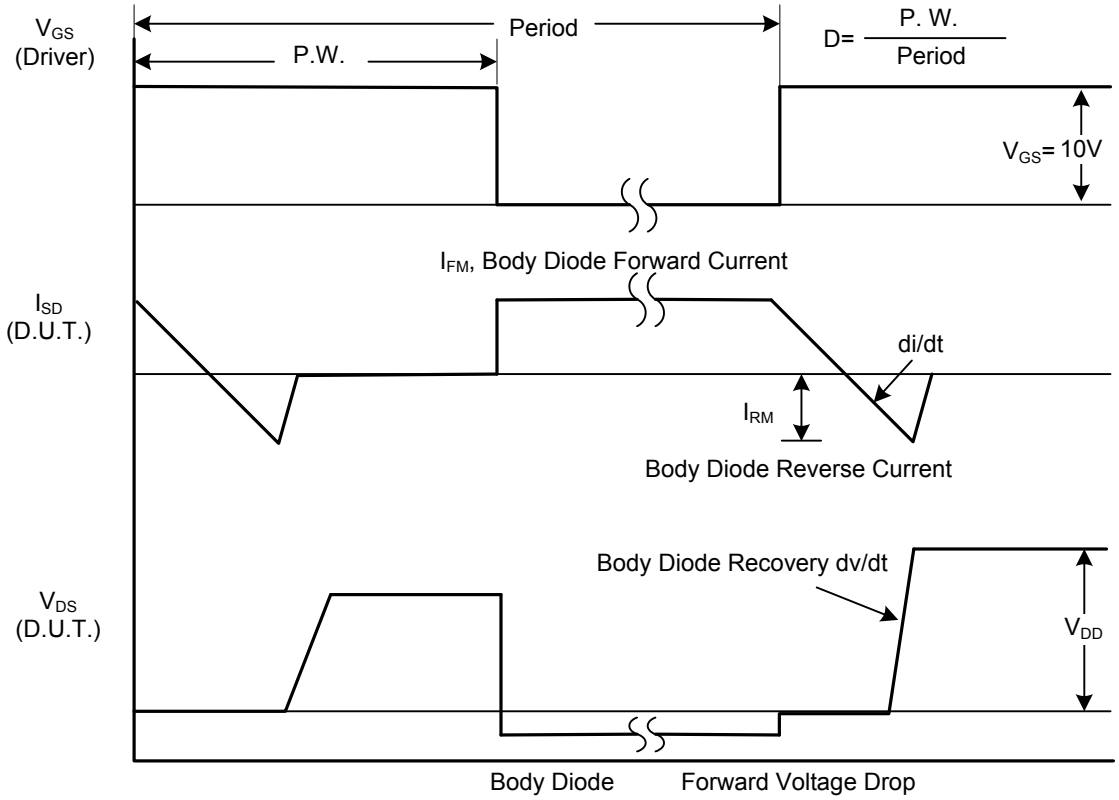
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	40			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=32V			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	I_D=250μA, V_{DS}=V_{GS}	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=60A			4.0	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1MHz		6730		pF
Output Capacitance		C_{OSS}			610		pF
Reverse Transfer Capacitance		C_{RSS}			508		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{DD}=32V, V_{GS}=10V, I_D=120A, (Note 1, 2)		160		nC
Gate to Source Charge		Q_{GS}			37		nC
Gate to Drain Charge		Q_{GD}			52		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=20V, V_{GS}=10V I_D=120A, R_G=3Ω (Note 1, 2)		26		ns
Rise Time		t_R			28		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			98		ns
Fall-Time		t_F			43		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I_S				120	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				240	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=120A			1.28	V
Body Diode Reverse Recovery Time (Note 1)		t_{rr}	I_S=30A, V_{GS}=0V dI_F/dt=100A/μs		49		nS
Body Diode Reverse Recovery Charge		Q_{rr}			53		nC

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

■ TEST CIRCUITS AND WAVEFORMS

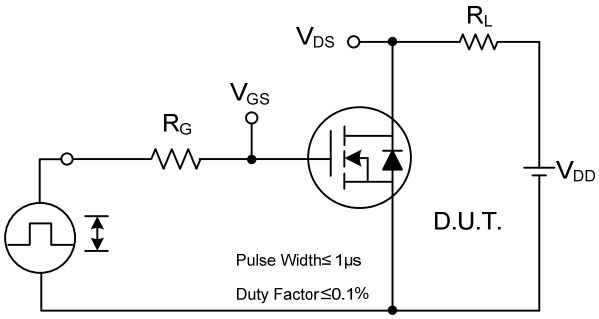


Peak Diode Recovery dv/dt Test Circuit

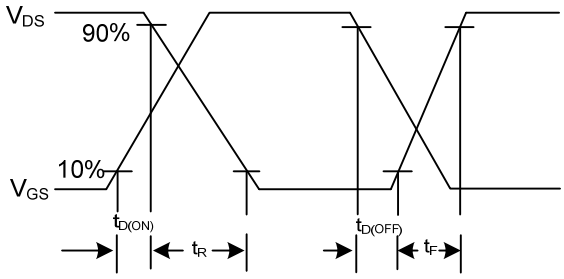


Peak Diode Recovery dv/dt Waveforms

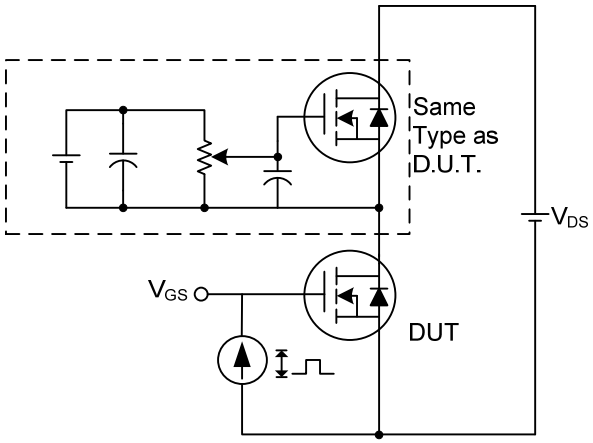
■ TEST CIRCUITS AND WAVEFORMS



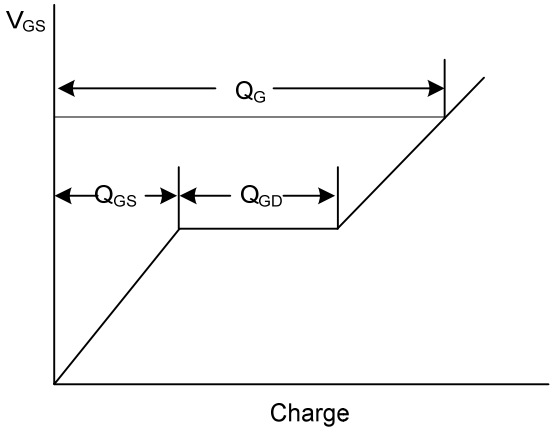
Switching Test Circuit



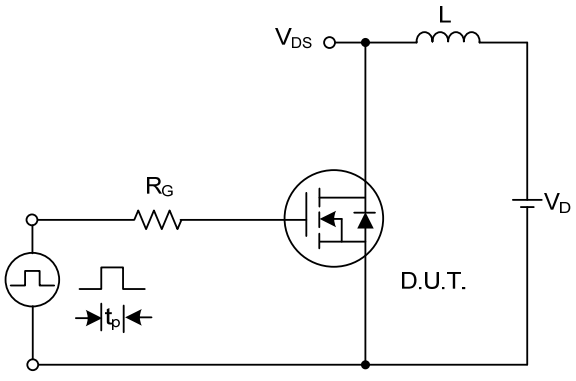
Switching Waveforms



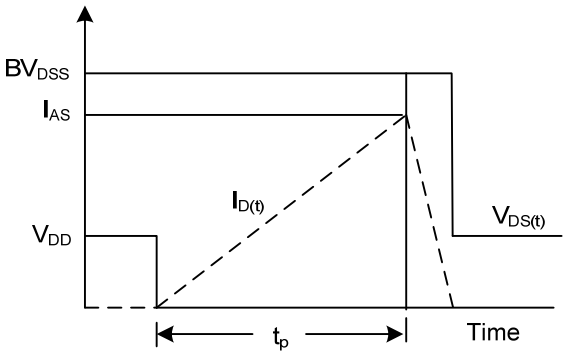
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms