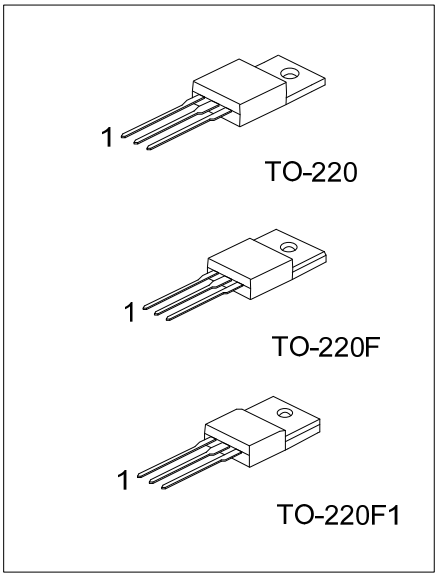
UPGE20N60

Insulated Gate Bipolar Transistor

600V, SMPS N-CHANNEL IGBT



■ DESCRIPTION

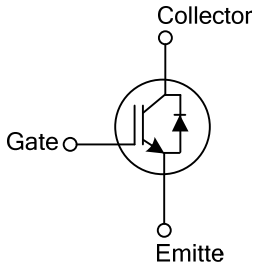
The UTC **UPGE20N60** is a N-channel IGBT. it uses UTC's advanced technology to provide customers with high input impedance, high switching speed and low conduction loss, etc.

The UTC **UPGE20N60** is suitable for high voltage switching, high frequency switch mode power supplies.

■ FEATURES

* $V_{CE(SAT)}$ ≤ 2.4V @ I_C=20A, V_{GE}=15V
* High switching speed
* High input impedance
* Low conduction loss

■ SYMBOL



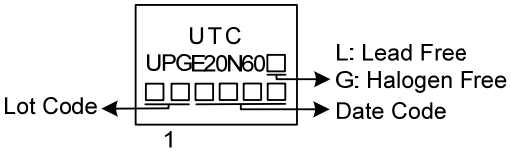
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UPGE20N60L-TA3-T	UPGE20N60G-TA3-T	TO-220	G	C	E	Tube
UPGE20N60L-TF1-T	UPGE20N60G-TF1-T	TO-220F1	G	C	E	Tube
UPGE20N60L-TF3-T	UPGE20N60G-TF3-T	TO-220F	G	C	E	Tube

Note: Pin Assignment: G: Gate C: Collector E: Emitter

UPGE20N60G-TA3-T (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube (2) TA3: TO-220, TF1: TO-220F1, TF3: TO-220F (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
Collector-Emitter Voltage		V_{CES}	600	V
Gate to Emitter Voltage Continuous		V_{GES}	±20	V
Continuous Collector Current	T_C=25°C	I_C	40	A
	T_C=100°C		20	A
Collector Current Pulsed (Note 2)		I_{CM}	70	A
Continuous Forward Current	T_C=25°C	I_F	40	A
	T_C=100°C		20	A
Short Circuit Withstand Time V_{GE} = 15V, V_{CC} ≤ 200V Allowed number of short circuits < 1000 Time between short circuits: ≥1.0s T_{VJ}= 25°C		t_{SC}	3	μs
Power Dissipation	TO-220	P_D	91	W
	TO-220F TO-220F1		31	W
Junction Temperature		T_J	-55 ~ +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. I_F ≤20A, di/dt ≤200A/μs, V_{CC} ≤ BV_{CES}, Starting T_J=25°C

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

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Collector-Emitter Breakdown Voltage	BV_{CES}	I_C=250μA, V_{GE}=0V		600			V
Collector-Emitter Leakage Current	I_{CES}	V_{CE}=600V, V_{GE}=0V				10	μA
Gate to Emitter Leakage Current	I_{GES}	V_{CE}=0V, V_{GE}=±20V				±400	nA
ON CHARACTERISTICS							
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	I_C=20A, V_{GE}=15V	T_J=25°C		1.95	2.4	V
			T_J=150°C		2.4		V
Gate to Emitter Threshold Voltage	$V_{GE(TH)}$	I_C=250μA, V_{CE}=V_{GE}		4.0		6.5	V
DYNAMIC CHARACTERISTICS							
Input Capacitance	C_{IES}	V_{CE}=25V, V_{GE}=0V, f=1MHz			551		pF
Output Capacitance	C_{OES}				71		pF
Reverse Transfer Capacitance	C_{RES}				9.6		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge	Q_G	V_{CE}=480V, V_{GE}=10V, I_C=20A			39.5		nC
Gate-Emitter Charge	Q_{GE}				12		nC
Gate-Collector Charge	Q_{GC}				17.1		nC
Current Turn-On Delay Time	$t_{D(ON)}$	V_{CE}=100V, V_{GE}=15V, I_C=20A, R_G=10Ω			6.3		ns
Current Rise Time	t_R				19.7		ns
Current Turn-Off Delay Time	$t_{D(OFF)}$				474		ns
Current Fall Time	t_F				2124		ns
Turn-On Switching Loss	E_{ON}				0.49		mJ
Turn-Off Switching Loss	E_{OFF}				9.66		mJ
DRAIN-SOURCE DIODE CHARACTERISTICS							
Forward Voltage Drop	V_{FM}	I_F=20A				2.4	V
Reverse Recovery Time	t_{rr}	I_F=20A, dI/dt=100A/μS, V_{CC}=400V			52		ns
Reverse Recovery Charge	Q_{rr}				107		nC

Note: Pulse Test: Pulse width≦50μs.

■ TEST CIRCUIT AND WAVEFORMS

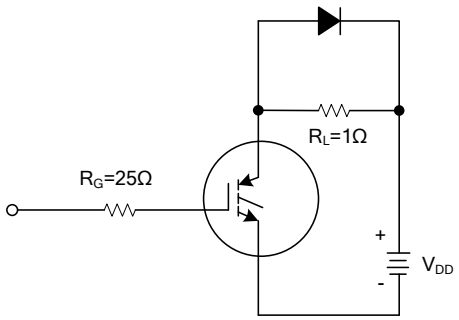


Fig 1. INDUCTIVE SWITCHING TEST CIRCUIT

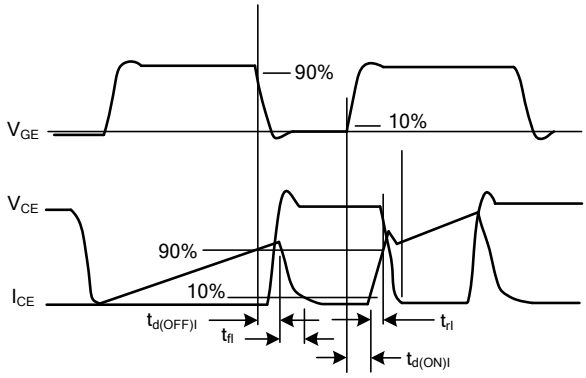


Fig 2. SWITCHING TEST WAVEFORMS