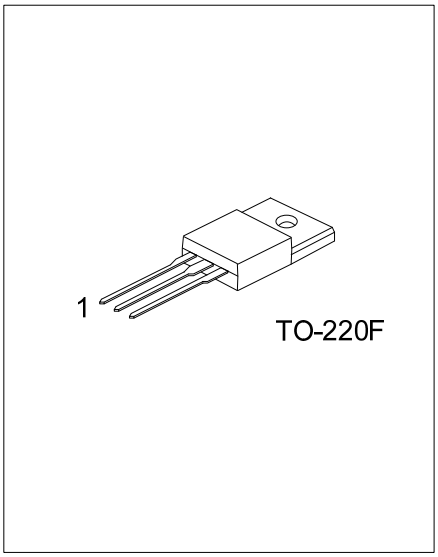
UPG9N60 **Preliminary** ***Insulated Gate Bipolar Transistor***

600V, SMPS N-CHANNEL IGBT



■ DESCRIPTION

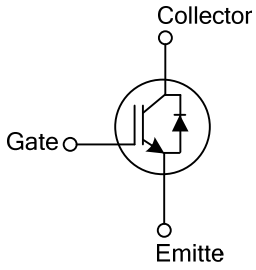
The UTC **UPG9N60** is a N-channel IGBT. it uses UTC's advanced technology to provide customers with high input impedance, high switching speed and low conduction loss, etc.

The UTC **UPG9N60** is suitable for high voltage switching, high frequency switch mode power supplies.

■ FEATURES

* $V_{CE(SAT)}$ ≤ 2.6V @ I_C=9.0A, V_{GE}=15V
* High switching speed
* High input impedance
* Low conduction loss

■ SYMBOL



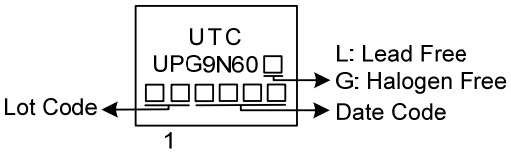
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UPG9N60L-TF3-T	UPG9N60G-TF3-T	TO-220F	G	C	E	Tube

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

UPG9N60G-TF3-T (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube (2) 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	18	A
	T_C=100°C		9	A
Collector Current Pulsed (Note 2)		I_{CM}	27	A
Continuous Forward Current	T_C=25°C	I_F	9	A
	T_C=100°C		4.5	A
Forward Current Pulsed		I_{FM}	70	A
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.2	V/ns
Power Dissipation		P_D	26	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 ≤9.0A, di/dt ≤200A/μs, V_{CC} ≤ BV_{CES}, Starting T_J=25°C

■ THERMAL DATA

PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	θ_{JA}	62.5	°C/W
Junction to Case	θ_{JC}	4.81	°C/W

■ 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							
Gate to Emitter Threshold Voltage	$V_{GE(TH)}$	I_C=250μA, V_{CE}=V_{GE}		4.0		6.0	V
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	I_C=9.0A, V_{GE}=15V	T_J=25°C		2.1	2.6	V
			T_J=150°C		2.5		V
DYNAMIC CHARACTERISTICS							
Input Capacitance	C_{IES}	V_{CE}=30V, V_{GE}=0V, f=1MHz			630		pF
Output Capacitance	C_{OES}				73		pF
Reverse Transfer Capacitance	C_{RES}				13.4		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge	Q_G	I_C=9.0A, V_{CE}=100V, V_{GE}=10V			35		nC
Gate-Emitter Charge	Q_{GE}				12.5		nC
Gate-Collector Charge	Q_{GC}				9.6		nC
Current Turn-On Delay Time	$t_{D(ON)}$	I_C=9.0A, V_{CE}=100V, V_{GE}=15V, R_G=10Ω			8		ns
Current Rise Time	t_R				19		ns
Current Turn-Off Delay Time	$t_{D(OFF)}$				80		ns
Current Fall Time	t_F				51		ns
DRAIN-SOURCE DIODE CHARACTERISTICS							
Forward Voltage Drop	V_{FM}	I_F=9.0A				2.4	V
Reverse Recovery Time	t_{rr}	I_F=9.0A, dI/dt=100A/μS, V_{CC}=400V			76		ns
Reverse Recovery Charge	Q_{rr}				260		nC

Note: Pulse Test: Pulse width≦50μs.

■ TEST CIRCUIT AND WAVEFORMS

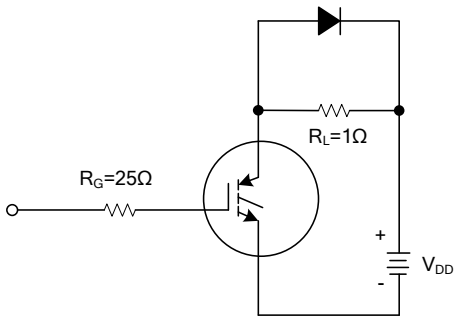


Fig 1. INDUCTIVE SWITCHING TEST CIRCUIT

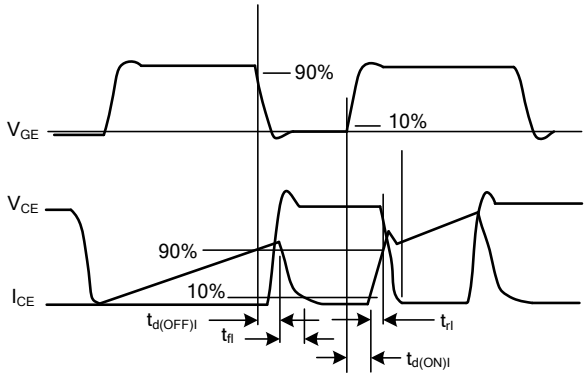


Fig 2. SWITCHING TEST WAVEFORMS