



UPG10N60

Preliminary

Insulated Gate Bipolar Transistor

600V, SMPS N-CHANNEL IGBT

DESCRIPTION

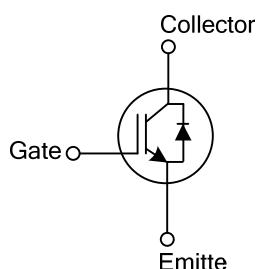
The UTC **UPG10N60** is a N-channel IGBT. it uses UTC's advanced technology to provide customers with high input impedance, high switching speed and low conduction loss, etc.

The UTC **UPG10N60** is suitable for high voltage switching, high frequency switch mode power supplies.

FEATURES

- * $V_{CE(SAT)} \leq 2.3V$ @ $I_C=10A$, $V_{GE}=15V$
- * High switching speed
- * High input impedance
- * Low conduction loss

SYMBOL



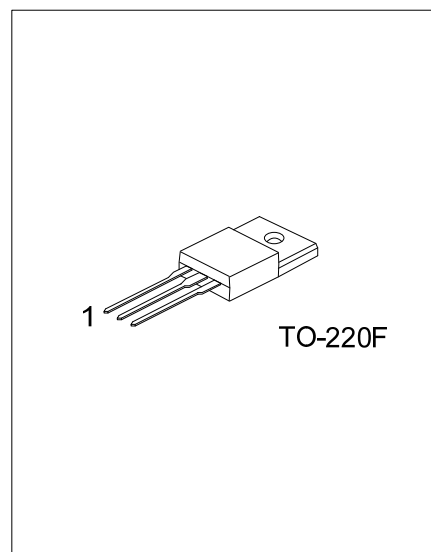
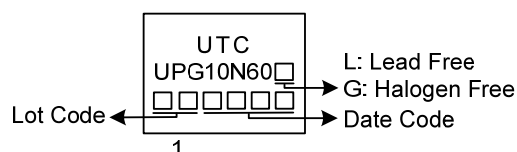
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UPG10N60L-TF3-T	UPG10N60G-TF3-T	TO-220F	G	C	E	Tube

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

UPG10N60G-TF3-T		(1) Packing Type	(1) T: Tube
		(2) Package Type	(2) TF3: TO-220F
		(3) Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free

MARKING



■ ABSOLUTE MAXIMUM RATINGS ($T_C=25^{\circ}\text{C}$, 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	$T_C=25^{\circ}\text{C}$	20	A
	$T_C=100^{\circ}\text{C}$	10	A
Collector Current Pulsed (Note 2)	I_{CM}	40	A
Short Circuit Withstand Time $V_{GE} = 15\text{V}$, $V_{CC} \leq 200\text{V}$ Allowed number of short circuits < 1000 Time between short circuits: $\geq 1.0\text{s}$ $T_{VJ} = 25^{\circ}\text{C}$	t_{SC}	5	μs
Power Dissipation	P_D	30	W
Junction Temperature	T_J	$-55 \sim +150$	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	$-55 \sim +150$	$^{\circ}\text{C}$

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.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Case	θ_{JC}	4.17	$^{\circ}\text{C/W}$

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Collector-Emitter Breakdown Voltage	BV_{CES}	$I_C=250\mu A$, $V_{GE}=0V$	600			V
Collector-Emitter Leakage Current	I_{CES}	$V_{CE}=600V$, $V_{GE}=0V$			10	μA
Gate to Emitter Leakage Current	I_{GES}	$V_{CE}=0V$, $V_{GE}=\pm 20V$			± 400	nA
ON CHARACTERISTICS						
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_C=10A$, $V_{GE}=15V$	$T_J=25^{\circ}C$		2.3	V
			$T_J=150^{\circ}C$	2.1		V
Gate to Emitter Threshold Voltage	$V_{GE(TH)}$	$I_C=250\mu A$, $V_{CE}=V_{GE}$	4.0		6.5	V
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{IES}	$V_{CE}=25V$, $V_{GE}=0V$, $f=1MHz$		764.7		pF
Output Capacitance	C_{OES}			91.5		pF
Reverse Transfer Capacitance	C_{RES}			15.1		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q_G	$V_{CE}=400V$, $I_C=10A$, $V_{GE}=15V$		53.1		nC
Gate-Emitter Charge	Q_{GE}			16.3		nC
Gate-Collector Charge	Q_{GC}			18		nC
Current Turn-On Delay Time	$t_{D(ON)}$	$V_{CC}=400V$, $I_C=10A$, $R_G=10\Omega$, $V_{GE}=0\sim 15V$, $L=500\mu H$		3.2		ns
Current Rise Time	t_R			13.3		ns
Current Turn-Off Delay Time	$t_{D(OFF)}$			28.7		ns
Current Fall Time	t_F			84.4		ns
DRAIN-SOURCE DIODE CHARACTERISTICS						
Forward Voltage Drop	V_{FM}	$I_F=10.0A$			2.0	V
Reverse Recovery Time	t_{rr}	$I_F=10.0A$, $dI/dt=100A/\mu S$,		49.4		ns
Reverse Recovery Charge	Q_{rr}	$V_{CC}=400V$		106		nC

Note: Pulse Test: Pulse width $\leq 50\mu\text{s}$.

■ TEST CIRCUIT AND WAVEFORMS

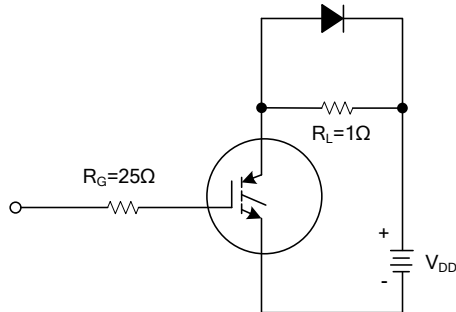


Fig 1. INDUCTIVE SWITCHING TEST CIRCUIT

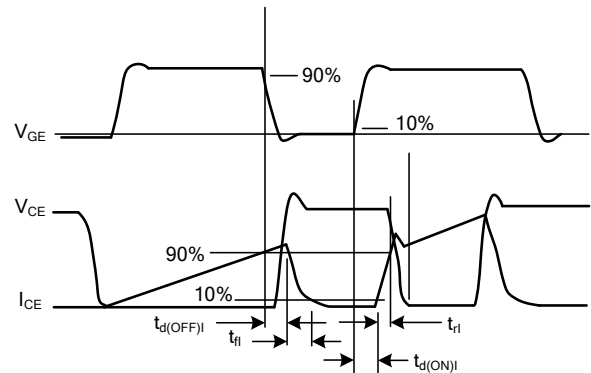


Fig 2. SWITCHING TEST WAVEFORMS

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