



UPGE20N60

Insulated Gate Bipolar Transistor

600V, SMPS N-CHANNEL IGBT

DESCRIPTION

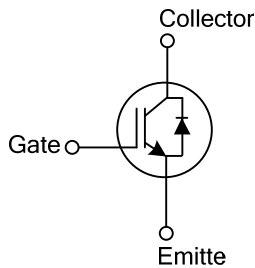
The UTC **UPGE20N60** is a N-channel IGBT. it uses UTC's advanced technology to provide customers with high input impedance, high switching speed and low conduction loss, etc.

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

FEATURES

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

SYMBOL



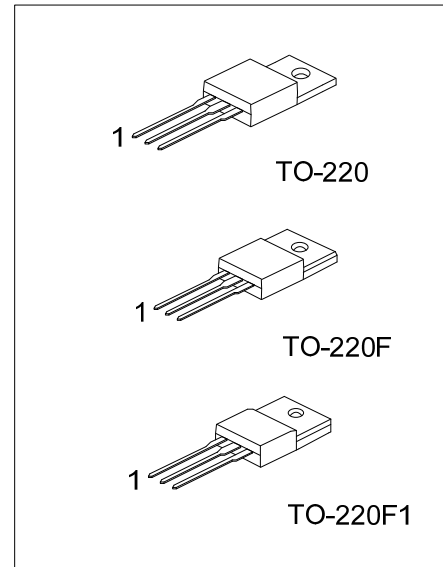
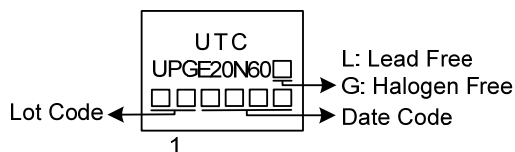
ORDERING INFORMATION

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

<p>UPGE20N60G-TA3-T</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) T: Tube</p> <p>(2) TA3: TO-220, TF1: TO-220F1, TF3: TO-220F</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING



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Insulated Gate Bipolar Transistor

■ 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	I_C	$T_C=25^\circ\text{C}$	40	A
		$T_C=100^\circ\text{C}$	20	A
Collector Current Pulsed (Note 2)	I_{CM}	70	A	
Continuous Forward Current	I_F	$T_C=25^\circ\text{C}$	40	A
		$T_C=100^\circ\text{C}$	20	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}	3	μs	
Power Dissipation	TO-220	91	W	
	TO-220F	31	W	
	TO-220F1			
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.

3. $I_F \leq 20\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{CC} \leq BV_{CES}$, Starting $T_J=25^\circ\text{C}$

■ 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}	$I_C=250\mu\text{A}$, $V_{GE}=0\text{V}$	600			V
Collector-Emitter Leakage Current	I_{CES}	$V_{CE}=600\text{V}$, $V_{GE}=0\text{V}$			10	μA
Gate to Emitter Leakage Current	I_{GES}	$V_{CE}=0\text{V}$, $V_{GE}=\pm 20\text{V}$			± 400	nA
ON CHARACTERISTICS						
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_C=20\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^\circ\text{C}$	1.95	2.4	V
			$T_J=150^\circ\text{C}$		2.4	V
Gate to Emitter Threshold Voltage	$V_{GE(TH)}$	$I_C=250\mu\text{A}$, $V_{CE}=V_{GE}$	4.0		6.5	V
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{IES}	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=1\text{MHz}$		551		pF
Output Capacitance	C_{OES}			71		pF
Reverse Transfer Capacitance	C_{RES}			9.6		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q_G	$V_{CE}=480\text{V}$, $V_{GE}=10\text{V}$, $I_C=20\text{A}$		39.5		nC
Gate-Emitter Charge	Q_{GE}			12		nC
Gate-Collector Charge	Q_{GC}			17.1		nC
Current Turn-On Delay Time	$t_{D(ON)}$	$V_{CE}=100\text{V}$, $V_{GE}=15\text{V}$, $I_C=20\text{A}$, $R_G=10\Omega$		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}	$I_F=20\text{A}$			2.4	V
Reverse Recovery Time	t_{rr}	$I_F=20\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$, $V_{CC}=400\text{V}$		52		ns
Reverse Recovery Charge	Q_{rr}			107		nC

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



■ TEST CIRCUIT AND WAVEFORMS

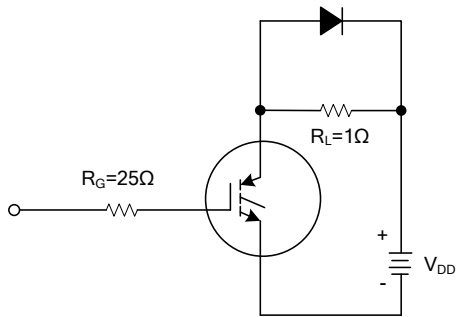


Fig 1. INDUCTIVE SWITCHING TEST CIRCUIT

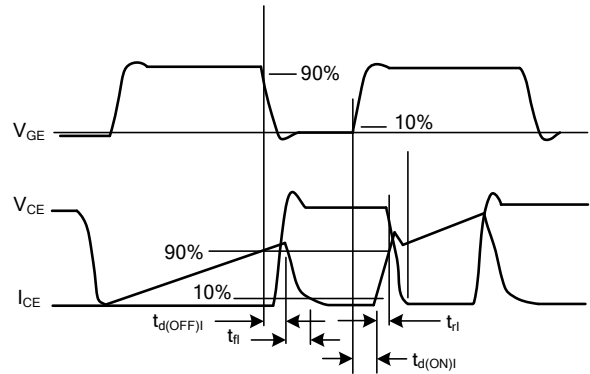


Fig 2. SWITCHING TEST WAVEFORMS

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