



UPG5N65

Preliminary

Insulated Gate Bipolar Transistor

650V, SMPS N-CHANNEL IGBT

DESCRIPTION

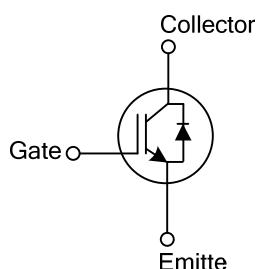
The UTC **UPG5N65** is a N-channel IGBT. it uses UTC's advanced technology to provide customers with high input impedance, high switching speed and low conduction loss, etc.

The UTC **UPG5N65** is suitable for high voltage switching, high frequency switch mode power supplies.

FEATURES

- * $V_{CE(SAT)} \leq 2.2V$ @ $I_C=5.0A$, $V_{GE}=15V$
- * High switching speed
- * High input impedance
- * Low conduction loss

SYMBOL

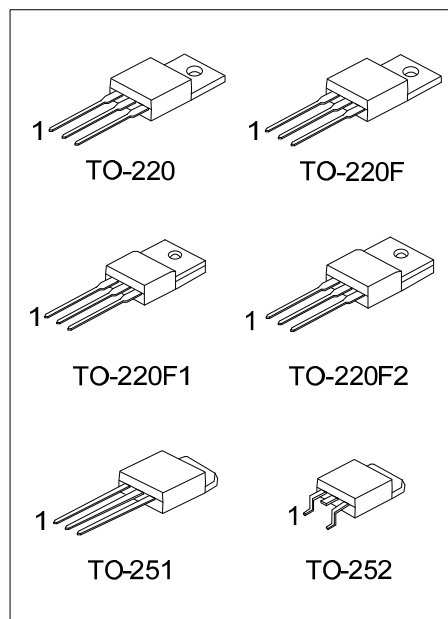


ORDERING INFORMATION

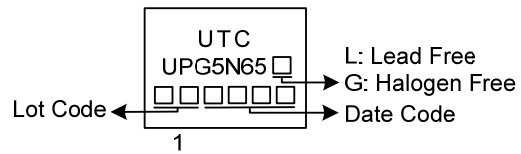
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UPG5N65L-TA3-T	UPG5N65G-TA3-T	TO-220	G	C	E	Tube
UPG5N65L-TF1-T	UPG5N65G-TF1-T	TO-220F1	G	C	E	Tube
UPG5N65L-TF2-T	UPG5N65G-TF2-T	TO-220F2	G	C	E	Tube
UPG5N65L-TF3-T	UPG5N65G-TF3-T	TO-220F	G	C	E	Tube
UPG5N65L-TM3-T	UPG5N65G-TM3-T	TO-251	G	C	E	Tube
UPG5N65L-TN3-R	UPG5N65G-TN3-R	TO-252	G	C	E	Tape Reel

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

<p>UPG5N65G-TA3-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>		<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2, TF3: TO-220F, TM3: TO-251, TN3: TO-252 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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■ MARKING



■ ABSOLUTE MAXIMUM RATINGS ($T_C=25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Collector-Emitter Voltage		V_{CES}	650	V
Gate to Emitter Voltage Continuous		V_{GES}	± 20	V
Continuous Collector Current	$T_C=25^\circ\text{C}$	I_C	10	A
	$T_C=100^\circ\text{C}$		5	A
Collector Current Pulsed (Note 2)		I_{CM}	20	A
Peak Diode Recovery dv/dt (Note 3)		dv/dt	6.2	V/ns
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}	10	μs
Power Dissipation	TO-220	P_D	84	W
	TO-220F/TO-220F1		24	W
	TO-220F2		36	W
	TO-251/TO-252		36	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.

3. $I_F \leq 9.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{CC} \leq BV_{CES}$, Starting $T_J=25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Case	TO-220	θ_{JC}	1.49	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1		5.21	$^\circ\text{C}/\text{W}$
	TO-220F2		3.47	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		3.47	$^\circ\text{C}/\text{W}$

■ 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}	$I_C=250\mu A, V_{GE}=0V$		650			V
Collector-Emitter Leakage Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V$				10	μA
Gate to Emitter Leakage Current	I_{GES}	$V_{CE}=0V, V_{GE}=\pm 20V$				± 400	nA
ON CHARACTERISTICS							
Gate to Emitter Threshold Voltage	$V_{GE(TH)}$	$I_C=250\mu A, V_{CE}=V_{GE}$		4.5		6.5	V
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_C=5.0A, V_{GE}=15V$	$T_J=25^{\circ}C$			2.2	V
			$T_J=150^{\circ}C$		2.2		V
DYNAMIC CHARACTERISTICS							
Input Capacitance	C_{IES}	$V_{CE}=25V, V_{GE}=0V, f=1MHz$			404		pF
Output Capacitance	C_{OES}				69		pF
Reverse Transfer Capacitance	C_{RES}				9.2		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge	Q_G	$V_{CE}=520V, I_C=5A$ $V_{GE}=0\sim 15V, I_G=10mA, L=2mH$			36.6		nC
Gate-Emitter Charge	Q_{GE}				11.1		nC
Gate-Collector Charge	Q_{GC}				13.9		nC
Current Turn-On Delay Time	$t_{D(ON)}$	$V_{CE}=400V, I_C=5A$ $V_{GE}=0\sim 15V, R_G=25\Omega, L=1mH$			13.5		ns
Current Rise Time	t_R				11.3		ns
Current Turn-Off Delay Time	$t_{D(OFF)}$				37.7		ns
Current Fall Time	t_F				172.5		ns
Turn-On Switching Loss	E_{ON}				0.09		mJ
Turn-Off Switching Loss	E_{OFF}				0.14		mJ
DRAIN-SOURCE DIODE CHARACTERISTICS							
Forward Voltage Drop	V_{FM}	$I_F=5A$				1.4	V
Reverse Recovery Time	t_{rr}	$I_F=5A, dI/dt=100A/\mu S, V_{CC}=400V$			48.1		ns
Reverse Recovery Charge	Q_{rr}				270.4		nC

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

■ TEST CIRCUIT AND WAVEFORMS

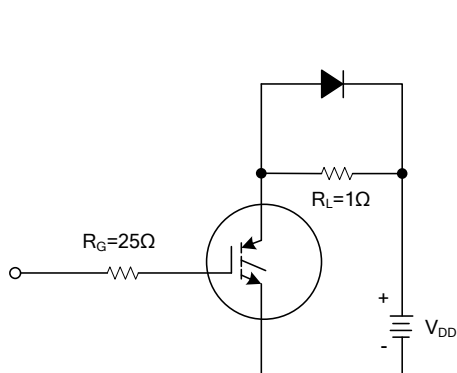


Fig 1. INDUCTIVE SWITCHING TEST CIRCUIT

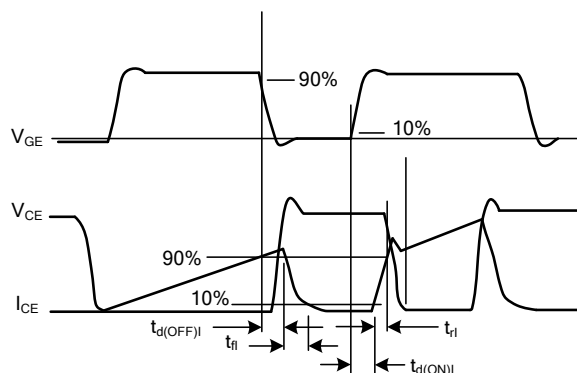


Fig 2. SWITCHING TEST WAVEFORMS

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