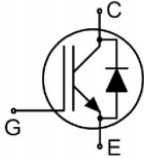


●Features

- Low Gate Charge
- Low Power Loss & High Efficiency
- Guard Ring & Environmental Protection
- High Temperature Application
- Green Molding Compound

●Application

- DC-DC Inverters
- UPS
- Industrial Heating

	$V_{CES}: 650V$ $I_C: 20A$ $V_{CE(SAT)}: 1.64V$
	■RoHS COMPLIANT TO-220

●Ordering Information:

Part Number	LHG20T65TL
Package	TO-220
Basic Ordering Unit (pcs)	1000
Normal Package Material Ordering Code	LHG20T65TL-TO220-TU
Halogen Free Ordering Code	LHG20T65TL-TO220-TU-HF

●Absolute Maximum Ratings (Ta=25℃)

Symbol	Parameter	Rating	Unit
Common Ratings (Ta=25℃ Unless Otherwise Noted)			
V _{CES}	Collector- Emitter Voltage (MIN.)	650	V
V _{GES}	Gate-Emitter Voltage	±20	
I _C	Continuous Collector Current	T _C = 25℃	A
		T _C = 100℃	
I _{CM}	Collector Current Continuous (Note 1.)	80.0	A
-	Turn-off Safe Area	80.0	A
P _D	Maximum Power Dissipation (T _C =25℃)	136	W
T _J	Maximum Junction Temperature	-50 to 150	℃
T _{STG}	Storage Temperature Range	-50 to 150	℃
T _L	Maximum Lead Temperature for Soldering Purposes	275	℃

Notes : ¹⁾ Collector current limited by maximum junction temperature.

● Thermal Resistance

Symbol	Parameter	Values		Unit
		Typ.	Max.	
R _{thJC}	Thermal Resistance, Junction - Case	-	0.91	℃/W
R _{thJA}	Thermal Resistance, Junction - Ambient	-	62.5	℃/W

● Electrical Characteristics (T_J=25℃ Unless Otherwise Noted)

Symbol	Parameter	Test Condition	Values			Unit
			Min.	Typ.	Max.	
Off Characteristics						
BV _{CES}	Collector-Emitter Breakdown Voltage	V _{GS} =0V, I _C =250uA	650	-	-	V
I _{CES}	Zero Gate Voltage Drain Current	V _{CE} = 600V, V _{GE} = 0V, T _C =25°C	-	-	1.0	mA
I _{GESF}	Gate-body Leakage Current (Forward)	V _{CE} =0V, V _{GE} =20V	-	-	250	nA
I _{GESR}	Gate-body Leakage Current (Reverse)	V _{CE} =0V, V _{GE} =-20V	-	-	-250	nA
ΔBV _{CES} /ΔT _J	Breakdown Voltage Temperature Coefficient.	I _C =1mA, Reference to 25°C	-	0.6	-	V/°C

• Electrical Characteristics ($T_J=25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Condition	Values			Unit
			Min.	Typ.	Max.	
On Characteristics						
V _{GE(th)}	Gate Threshold Voltage	V _{CE} = V _{GE} , I _C =250uA	3.5	5.0	7.0	V
V _{CE(SAT)}	Collector- Emitter Saturation Voltage	V _{GE} =15V , I _C =20A T _C = 25°C	-	1.64	2.4	V

• Electrical Characteristics ($T_J=25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Condition	Values			Unit
			Min.	Typ.	Max.	
Switching Characteristics						
C _{ies}	Input Capacitance	V _{CE} =30V, V _{GE} =0V, Frequency=1.0MHz	-	1419	-	pF
C _{oes}	Output Capacitance		-	79	-	
C _{res}	Reverse Transfer Capacitance		-	43	-	
t _{d(ON)}	Turn-on Delay Time	V _{CE} = 400V, I _C = 20A, R _G = 10Ω V _{GE} = 15V T _C =25°C	-	34	-	nS
t _r	Turn-on Rise Time		-	36	-	
t _{d(OFF)}	Turn-off Delay Time		-	125	-	
t _f	Turn-off Fall Time		-	50	-	
E _{on}	Turn-on Energy		-	0.73	-	mJ
E _{off}	Turn-off Energy	-	0.39	-		
E _{total}	Total Switching Energy	-	1.1	-		
Q _g	Total Gate Charge	V _{CE} =400V, V _{GE} =15V, I _C =20A	-	83	-	nC
Q _{ge}	Gate to Emitter Charge		-	17	-	
Q _{gc}	Gate to Collector Charge		-	52	-	
Anti-Parallel Diode Characteristics and Maximum Ratings						
V _F	Emitter-Collector Diode Forward Voltage	V _{GS} =0V, I _S =20A	-	1.45	1.7	V
t _{rr}	Reverse Recovery Time	I _S =20A, V _{GE} =0V, V _R =400V di _F /dt=100A/ s (Note 4)	-	50	-	nS
Q _{rr}	Reverse Recovery Charge		-	124	-	nC
I _{R_{RM}}	Diode Reverse Recovery Current		-	10	-	A

Note 1 : Pulse width limited by maximum junction temperature.

Note 2 : Allowed number of short circuits: < 1000 Time between short circuit: >1s.

Note 3 : Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

Note 4 : Essentially independent of operating temperature.

● **Electrical Characteristic Curves**

Fig. 1 Typical Output Characteristics

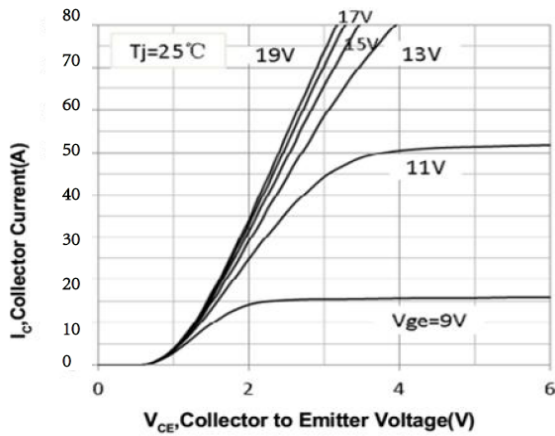


Fig. 2 Typical Output Characteristic

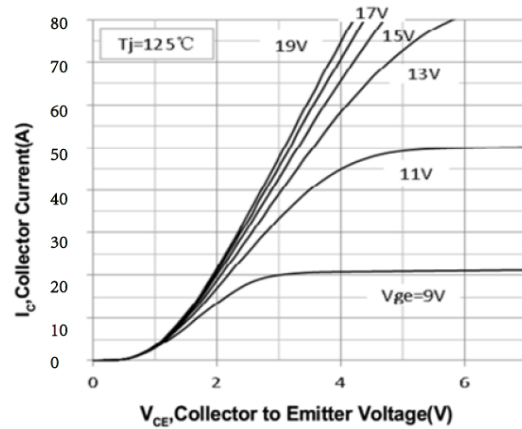


Fig. 3 $V_{CE(SAT)}$ vs. I_C Characteristics

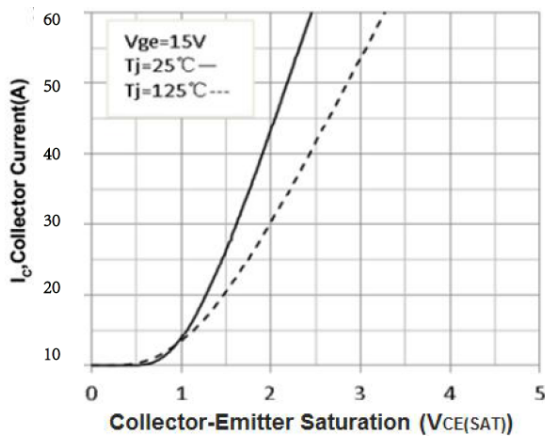


Fig. 4 $V_{CE(SAT)}$ vs. T_C

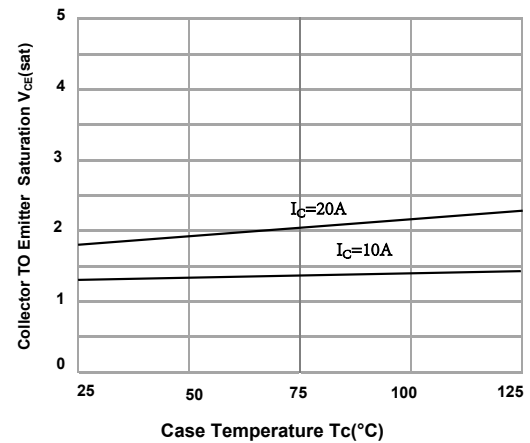


Fig. 5 Capacitance Characteristics

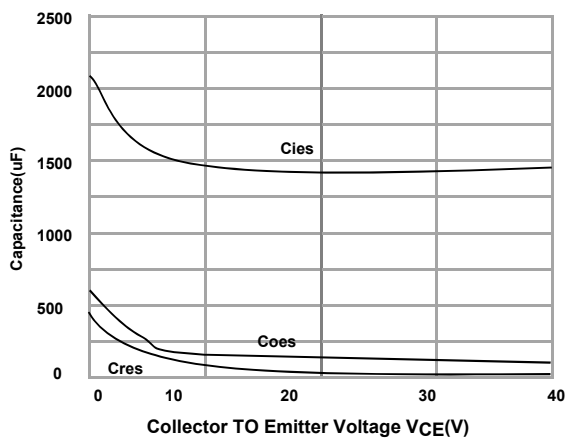
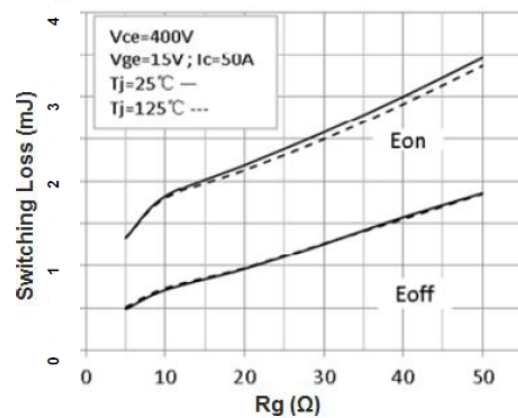


Fig. 6 Switching Energy Loss Characteristics



● Electrical Characteristic Curves

Fig. 7 R_g vs. Switching Time

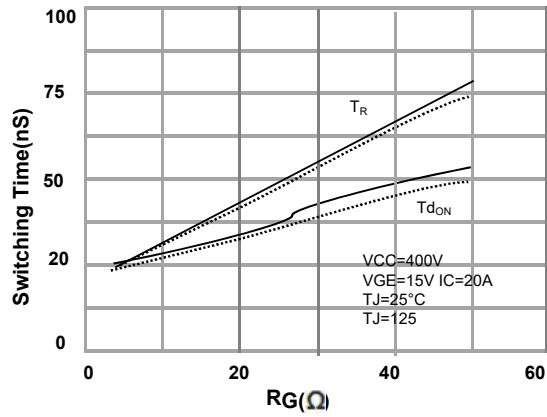


Fig. 8 R_g vs. Switching Time

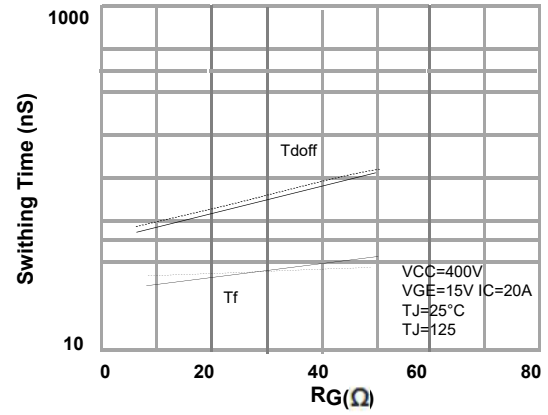


Fig. 9 T_C vs. Switching Time

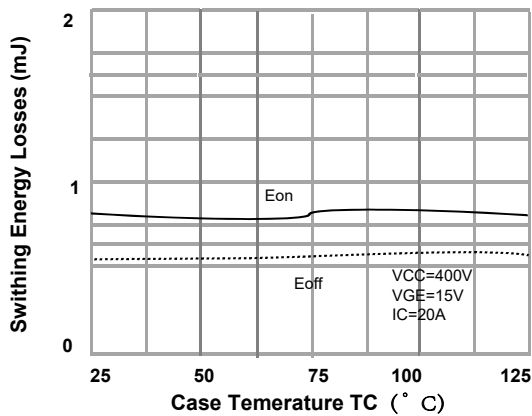


Fig. 10 T_C vs. Switching Time

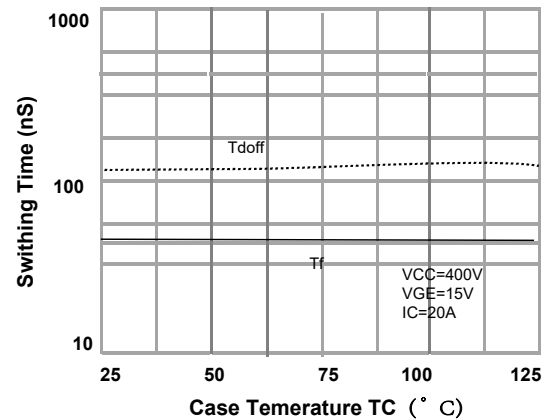


Fig. 11 T_C vs. Switching Loss

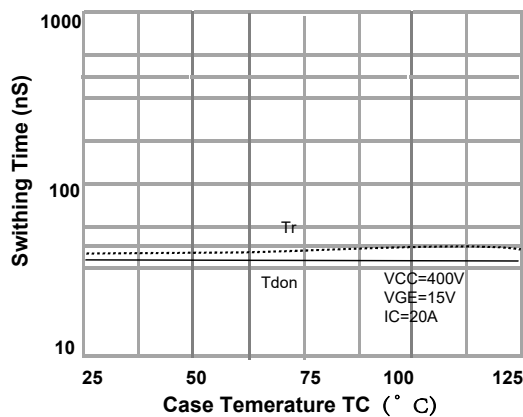
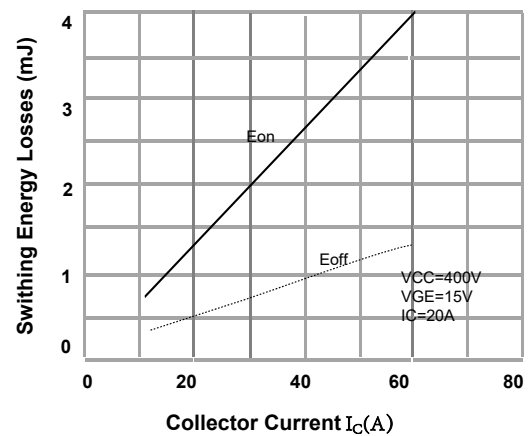


Fig. 12 I_C vs. Switching Loss



● Electrical Characteristic Curves

Fig. 13 I_C vs. Switching Time

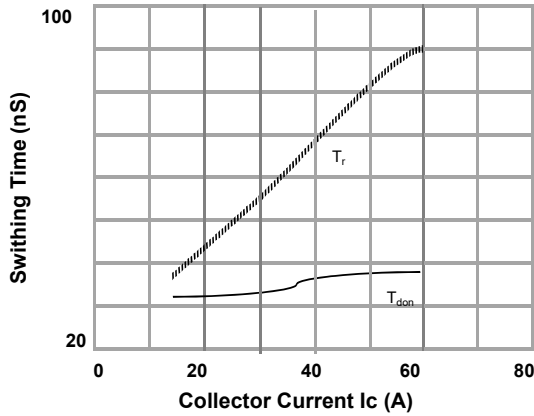


Fig. 14 I_C vs. Switching Time

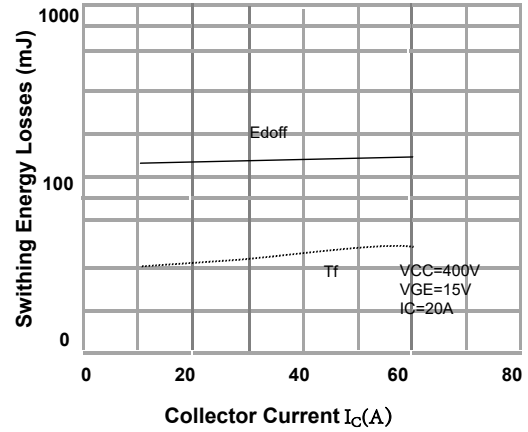


Fig. 14 Forward Safe Operating Area

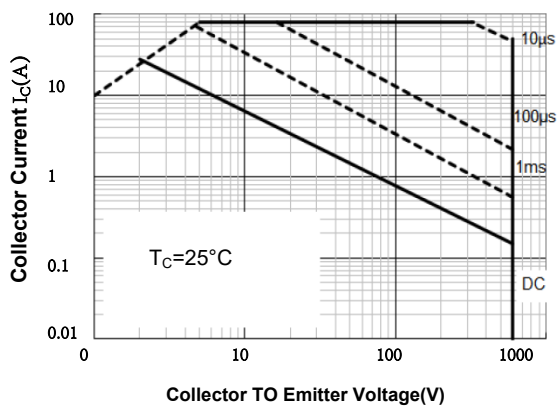


Fig. 15 T_C vs. I_C Current (A)

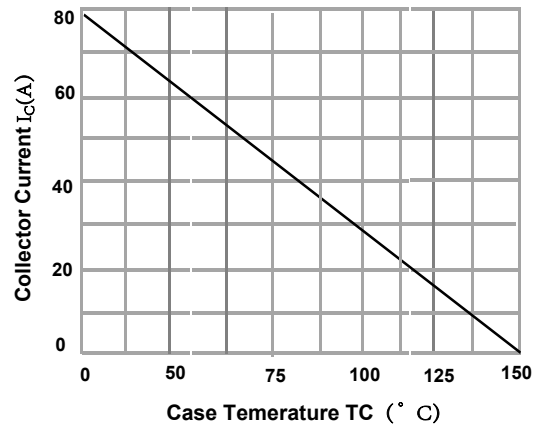
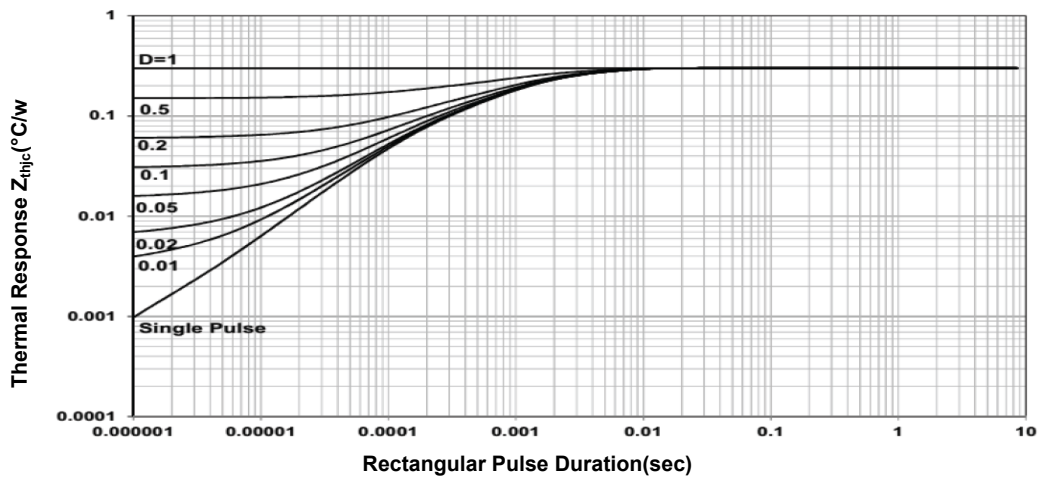


Fig. 19 Transient Thermal Impedance for IGBT



•Dimensions (TO-220)

UNIT:mm

SYMBOL	min	max	SYMBOL	min	max
A	4.25	4.85	B1	2.60	3.00
A1	2.30	3.00	e	2.40	2.70
A2	1.20	1.40	e1	4.95	5.25
b	0.60	0.90	L	12.60	14.40
b1	1.10	1.70	L1	2.40	4.00
c	0.40	0.70	∅P	3.50	3.90
D	9.80	10.60			
B	15.20	16.20			

