

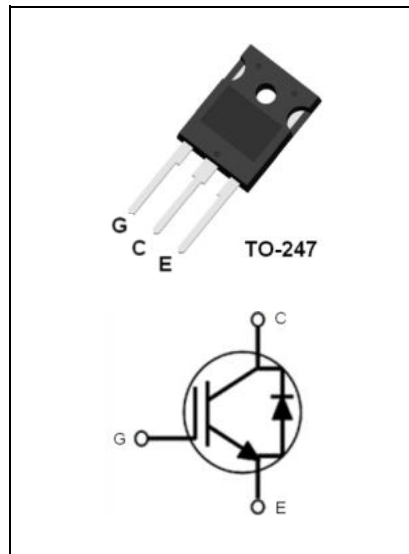
1200V 40A NPT IGBT

Description

The device is designed by advanced NPT technology process. This IGBT offer low conduction and switching losses. This IGBT have excellent quality for application such as UPS, inverter, AC&DC motor controls and other switching applications.

Features

- NPT Technology
- $V_{CE(sat)}=2.8V@I_C=40A$
- $t_r=35ns$ (typ.)
- High Speed Switching & Low Power Loss
- High Input Impedance



Applications

- UPS, Inverter, Welder, AC&DC motor controls

Absolute Maximum Ratings

Symbol	Parameter	Ratings	Unit	
V_{CES}	Collector to Emitter Voltage	1200	V	
V_{GES}	Gate to Emitter Voltage	± 20	V	
I_C	Collector Current	$T_C=25^\circ C$	64	A
		$T_C=100^\circ C$	40	A
I_{CM}	Pulsed Collector Current	120	A	
I_F	Diode Continuous Forward Current	$T_C=100^\circ C$	15	A
I_{FM}	Diode Maximum Forward Current	60	A	
P_D	Maximum Power Dissipation	$T_C=25^\circ C$	350	W
		$T_C=100^\circ C$	140	W
T_J	Operating Junction Temperature Range	-55~+150	$^\circ C$	
T_{STG}	Storage Temperature Range	-55~+150	$^\circ C$	

Thermal Characteristics

Symbol	Parameter	Ratings	Unit
$R_{th(J-C)}$ (IGBT)	Thermal Resistance, Junction to case for IGBT	0.35	$^\circ C/W$
$R_{th(J-C)}$ (Diode)	Thermal Resistance, Junction to case for Diode	1.3	$^\circ C/W$
$R_{th(J-A)}$	Thermal Resistance, Junction to Ambient	40	$^\circ C/W$

Electrical Characteristics of IGBT @ $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{CES}	Collector to Emitter Breakdown Voltage	$V_{GE}=0V, I_C=250\mu A$	1200	-	-	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=40A, V_{GE}=15V$	-	2.8	3.4	V
		$I_C=40A, V_{GE}=15V, T_C=125^\circ\text{C}$	-	3.8	-	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{CE}=V_{GE}, I_C=250\mu A$	4.5	5.6	6.5	V
I_{CES}	Zero Gate Voltage Collector Current	$V_{CE}=V_{CES}, V_{GE}=0V$	-	-	1	mA
I_{GES}	Gate to Emitter Leakage Current	$V_{GE}=V_{GES}, V_{CE}=0V$	-	-	± 250	nA

Electrical Characteristics of Diode @ $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	$I_F=15A$	-	2.8	-	V
		$I_F=15A, T_C=125^\circ\text{C}$	-	2.2	-	V
t_{rr}	Diode Reverse Recovery Time	$I_F=15A, di/dt=-200A/\mu s$	-	35	-	ns
I_{rr}	Diode Peak Reverse Recovery Current		-	6.6	-	A
Q_{rr}	Diode Reverse Recovery Charge		-	1080	-	nC

Switching Characteristics @ $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$I_C=40A, V_{CC}=600V, V_{GE}=15V, R_G=14\Omega$ Inductive Load, $T_C=25^\circ\text{C}$	-	23.0	-	ns
t_r	Rising Time		-	67.0	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	169.0	-	ns
t_f	Falling Time		-	28.0	-	ns
E_{on}	Turn-on Switching Loss		-	3.2	-	mJ
E_{off}	Turn-off Switching Loss		-	1.1	-	mJ
E_{ts}	Total Switching Loss		-	4.3	-	mJ
$t_{d(on)}$	Turn-on Delay Time	$I_C=40A, V_{CC}=600V, V_{GE}=15V, R_G=14\Omega$ Inductive Load, $T_C=125^\circ\text{C}$	-	23.0	-	ns
t_r	Rising Time		-	68.0	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	187.0	-	ns
t_f	Falling Time		-	90.0	-	ns
E_{on}	Turn-on Switching Loss		-	3.3	-	mJ
E_{off}	Turn-off Switching Loss		-	1.9	-	mJ
E_{ts}	Total Switching Loss		-	5.2	-	mJ
C_{ies}	Input Capacitance	$V_{GE}=0V, V_{CE}=15V, f=1.0\text{MHz}$	-	3430	-	pF
C_{res}	Reverse Transfer Capacitance		-	120	-	pF
C_{oes}	Output Capacitance		-	350	-	pF
Q_g	Total Gate Charge	$I_C=40A, V_{CC}=600V, V_{GE}=15V$	-	32	-	nC
Q_{ge}	Gate to Emitter Charge		-	140	-	nC
Q_{gc}	Gate to Collector Charge		-	230	-	nC
t_{sc}	Short Circuit Withstand Time	$V_{CC}=600V, V_{GE}=15V$	10	-	-	us

Typical Performance Characteristics

Fig. 1. Typical Output Characteristics

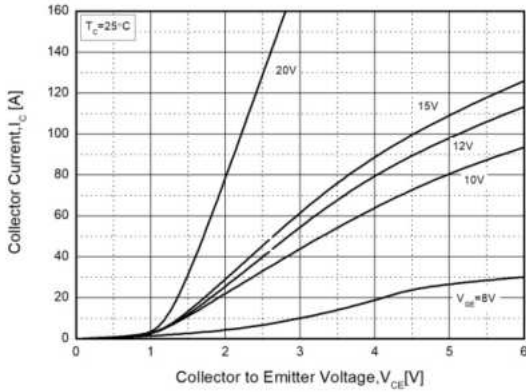


Fig. 2. Typical Saturation Voltage Characteristics

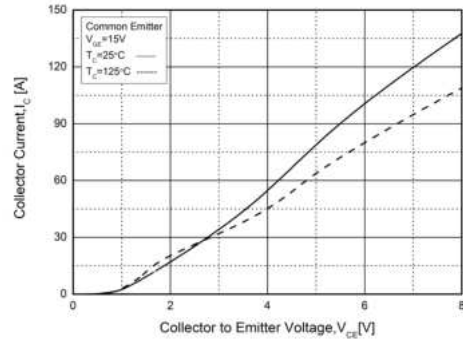


Fig. 3. Typical Saturation Voltage vs. T_C

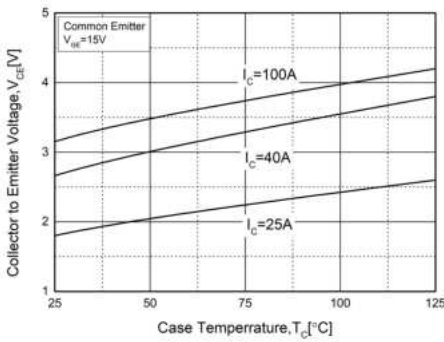


Fig. 4. Diode Forward Characteristics

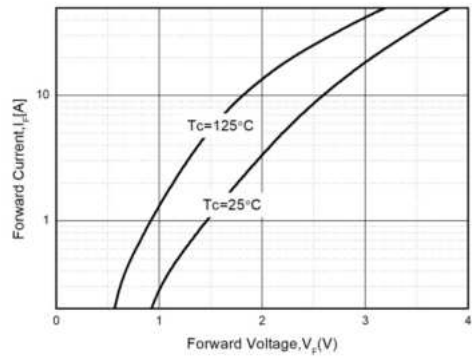


Fig. 5. Typical Capacitance Characteristics

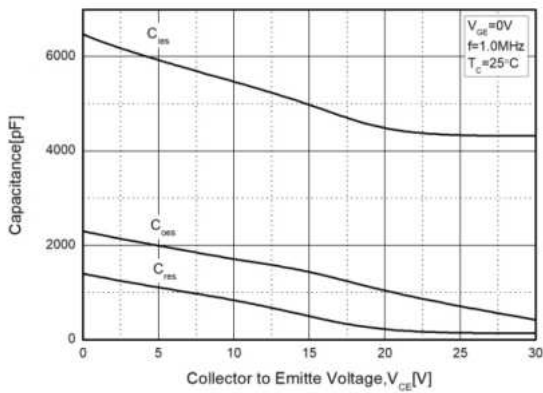
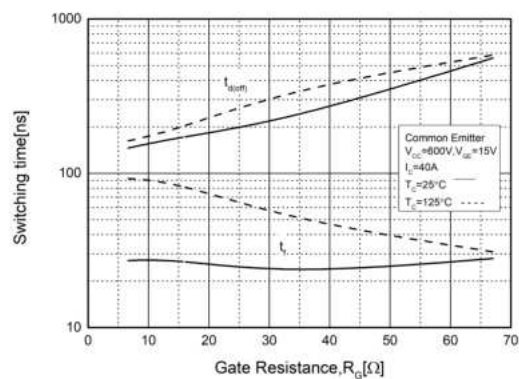


Fig. 6. Turn-on Characteristics vs. R_G



Typical Performance Characteristics

Fig. 7. Turn-off Characteristics vs. R_G

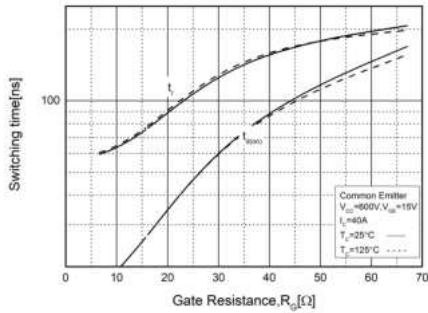


Fig. 8. Switching Loss vs. R_G

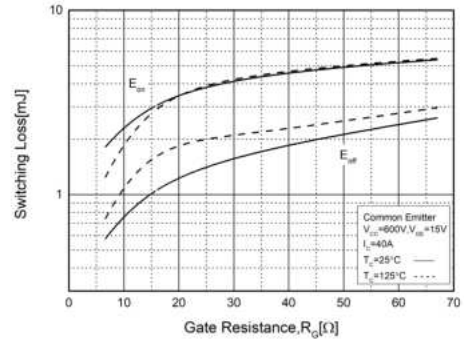


Fig. 9. Turn-on Characteristics vs. I_C

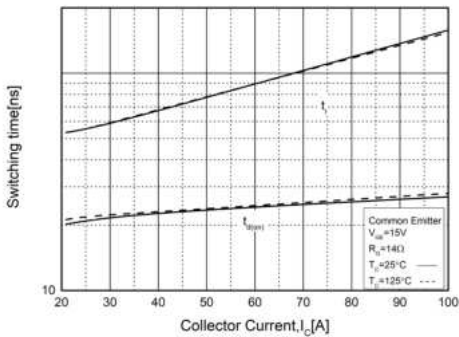


Fig. 10. Turn-off Characteristics vs. I_C

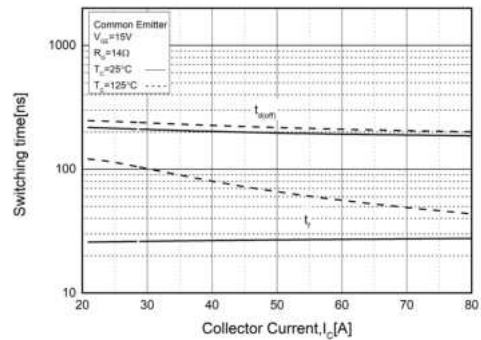
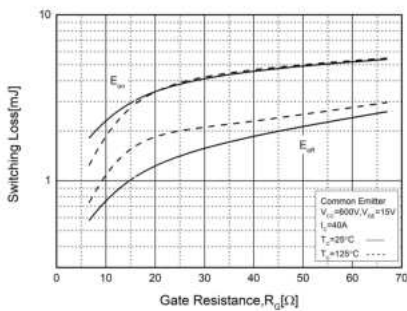


Fig. 11. Switching Loss vs. I_C



Package Dimensions

TO-247

(Dimensions in Millimeters)

