

Features

- Very high speed switching
- Tight parameters distribution
- Tail-less switching off
- Low forward drop free-wheeling diode
- Low thermal resistance

Applications

- Induction cooking, rice cooking
- Soft-switching applications

Description

This device is an IGBT developed using an advanced proprietary trench gate and field stop structure. This device is well-suited for resonant or soft-switching applications.

Furthermore, a slightly positive $V_{CE(sat)}$ temperature coefficient and very tight parameter distribution result in easier paralleling operation.

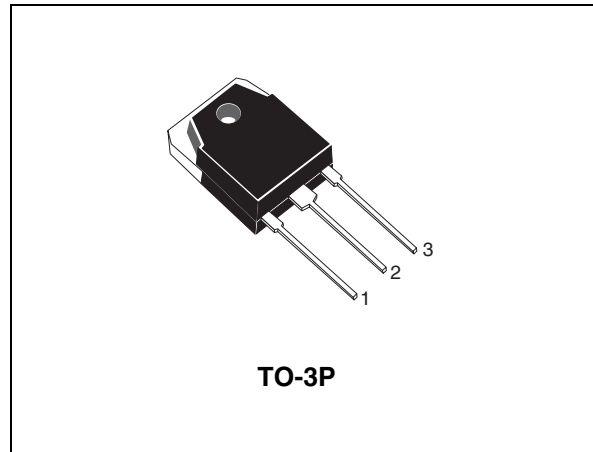


Figure 1. Internal schematic diagram

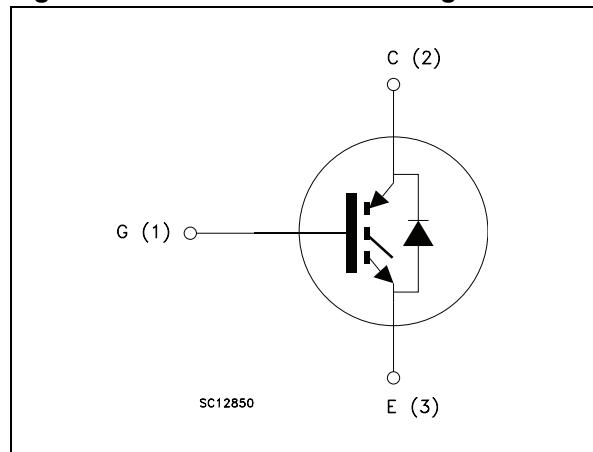


Table 1. Device summary

Order code	Marking	Package	Packaging
STGWT28IH120DF	GWT28IH120DF	TO-3P	Tube

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CES}	Collector-emitter voltage ($V_{GE} = 0$)	1200	V
I_C	Continuous collector current at $T_C = 25\text{ °C}$	50	A
I_C	Continuous collector current at $T_C = 100\text{ °C}$	25	A
$I_{CP}^{(1)}$	Pulsed collector current	75	A
I_F	Continuous collector current at $T_C = 25\text{ °C}$	25	A
	Continuous collector current at $T_C = 100\text{ °C}$	50	A
$I_F^{(1)}$	Pulsed forward current	100	A
V_{GE}	Gate-emitter voltage	± 20	V
P_{TOT}	Total dissipation at $T_C = 25\text{ °C}$	330	W
T_J	Operating junction temperature	- 55 to 150	$^{\circ}\text{C}$

1. Pulse width limited by maximum junction temperature and turn-off within RBSOA

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance junction-case IGBT	0.38	$^{\circ}\text{C/W}$
R_{thJC}	Thermal resistance junction-case diode	2.0	$^{\circ}\text{C/W}$
R_{thJA}	Thermal resistance junction-ambient	50	$^{\circ}\text{C/W}$

2 Electrical characteristics

$T_J = 25\text{ °C}$ unless otherwise specified.

Table 4. Static

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)CES}$	Collector-emitter breakdown voltage ($V_{GE} = 0$)	$I_C = 1\text{ mA}$	1200			V
$V_{CE(sat)}$	Collector-emitter saturation voltage	$V_{GE} = 15\text{ V}$, $I_C = 25\text{ A}$ $V_{GE} = 15\text{ V}$, $I_C = 25\text{ A}$, $T_J = 150\text{ °C}$		2.15 2.25		V V
$V_{GE(th)}$	Gate threshold voltage	$V_{CE} = V_{GE}$, $I_C = 1\text{ mA}$		6		V
V_F	Forward on-voltage	$I_F = 25\text{ A}$ $I_F = 25\text{ A}$, $T_J = 150\text{ °C}$	-	1.3	1.9	V V
I_{CES}	Collector cut-off current ($V_{GE} = 0$)	$V_{CE} = 1200\text{ V}$ $V_{CE} = 1200\text{ V}$, $T_J = 150\text{ °C}$			100 1	μA mA
I_{GES}	Gate-emitter leakage current ($V_{CE} = 0$)	$V_{GE} = \pm 20\text{ V}$			250	nA

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{ies}	Input capacitance	$V_{CE} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GE} = 0$	-	4880	-	pF
C_{oes}	Output capacitance					
C_{res}	Reverse transfer capacitance					
Q_g	Total gate charge	$V_{CE} = 600\text{ V}$, $I_C = 25\text{ A}$, $V_{GE} = 15\text{ V}$	-	144	-	nC
Q_{ge}	Gate-emitter charge					
Q_{gc}	Gate-collector charge					

Table 6. Switching on/off (inductive load)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_r(V_{off})$	Off voltage rise time	$V_{CC} = 600\text{ V}$, $I_C = 25\text{ A}$ $R_G = 22\ \Omega$, $V_{GE} = 15\text{ V}$ <i>(see Figure 2)</i>	-	50	-	ns
$t_{d(off)}$	Turn-off delay time					
t_f	Current fall time					
$t_r(V_{off})$	Off voltage rise time	$V_{CC} = 600\text{ V}$, $I_C = 25\text{ A}$ $R_G = 22\ \Omega$, $V_{GE} = 15\text{ V}$, $T_J = 150\text{ °C}$ <i>(see Figure 2)</i>	-	72	-	ns
$t_{d(off)}$	Turn-off delay time					
t_f	Current fall time					

Table 7. Switching energy (inductive load)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$E_{\text{off}}^{(1)}$	Turn-off switching losses	$V_{\text{CC}} = 600 \text{ V}$, $I_{\text{C}} = 25 \text{ A}$ $R_{\text{G}} = 22 \text{ } \Omega$, $V_{\text{GE}} = 15 \text{ V}$ (see Figure 2)	-	0.78	-	mJ
$E_{\text{off}}^{(1)}$	Turn-off switching losses	$V_{\text{CC}} = 600 \text{ V}$, $I_{\text{C}} = 25 \text{ A}$ $R_{\text{G}} = 22 \text{ } \Omega$, $V_{\text{GE}} = 15 \text{ V}$ $T_{\text{J}} = 150 \text{ } ^\circ\text{C}$ (see Figure 2)	-	1.36	-	mJ

1. Turn-off losses include also the tail of the collector current

3 Test circuits

Figure 2. Test circuit for inductive load switching

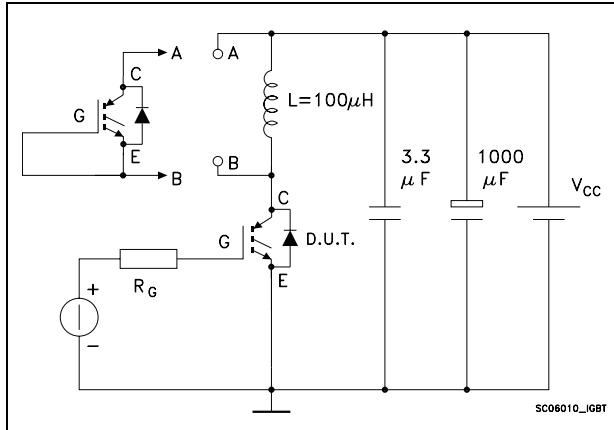


Figure 3. Gate charge test circuit

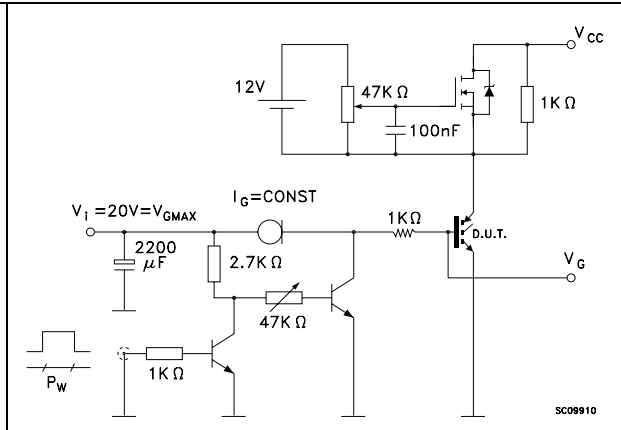


Figure 4. Switching waveform

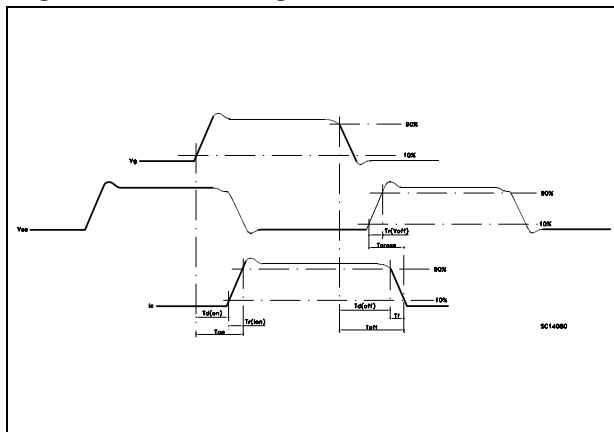
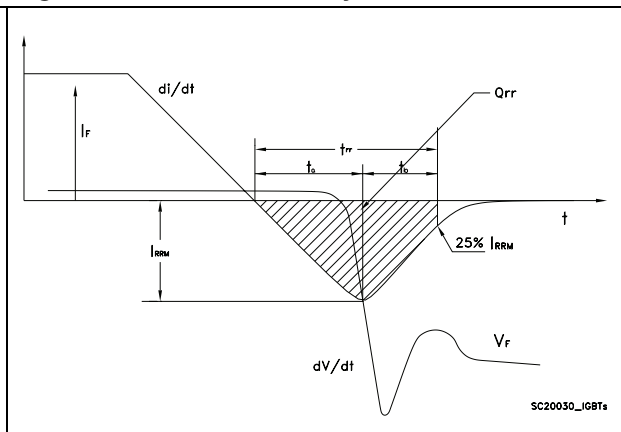


Figure 5. Diode recovery time waveform



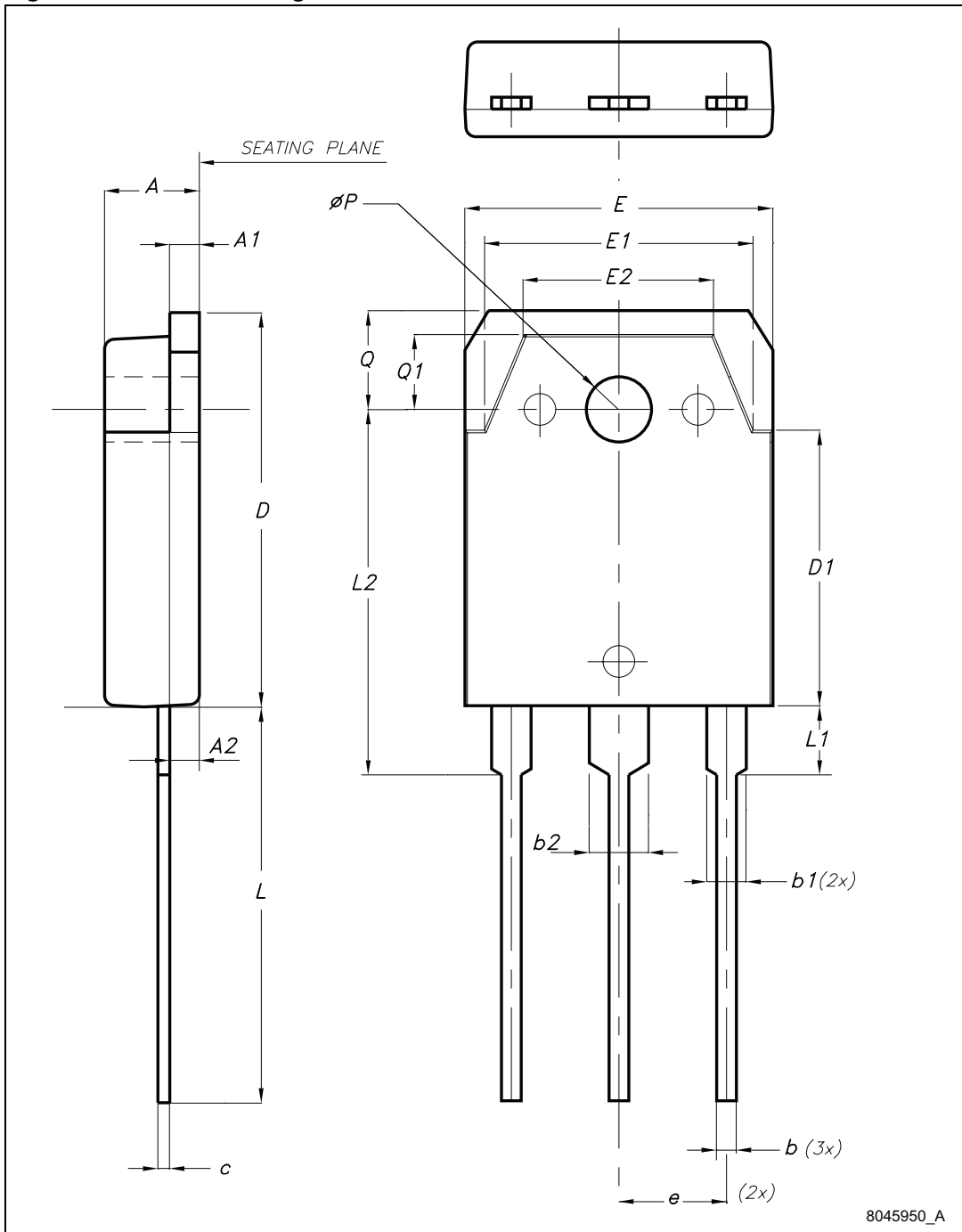
4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 8. TO-3P mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.60		5
A1	1.45	1.50	1.65
A2	1.20	1.40	1.60
b	0.80	1	1.20
b1	1.80		2.20
b2	2.80		3.20
c	0.55	0.60	0.75
D	19.70	19.90	20.10
D1		13.90	
E	15.40		15.80
E1		13.60	
E2		9.60	
e	5.15	5.45	5.75
L	19.50	20	20.50
L1		3.50	
L2	18.20	18.40	18.60
øP	3.10		3.30
Q		5	
Q1		3.80	

Figure 6. TO-3P drawing



5 Revision history

Table 9. Document revision history

Date	Revision	Changes
26-Jul-2012	1	Initial release.

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