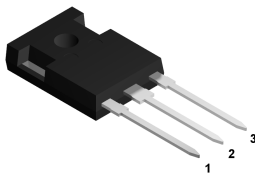
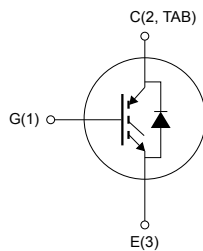


## Trench gate field-stop, 1350 V, 35 A, soft-switching IH2 series IGBT in a TO-247 long leads package



TO-247 long leads



NG1E3C2T

### Features

- Designed for soft commutation only
- Maximum junction temperature:  $T_J = 175\text{ °C}$
- Low  $V_{CE(sat)} = 1.75\text{ V (typ.) @ } I_C = 30\text{ A}$
- Very low  $V_F$  and soft-recovery co-packaged diode
- Minimized tail current
- Tight parameter distribution
- Low thermal resistance
- Positive temperature coefficient

### Applications

- Induction heating
- Resonant converters
- Microwave ovens

### Description

The newest IGBT 1350 V IH2 soft-switching series has been developed using an advanced proprietary trench gate field-stop structure, whose performance is optimized both in conduction and in switching energy losses for soft-switching applications. A freewheeling diode with a very low drop forward voltage is co-packaged. The result is a product specifically designed to maximize efficiency for any resonant and soft-switching applications.

#### Product status link

[STGWA35IH135DLF2](#)

#### Product summary

<b>Order code</b>	STGWA35IH135DLF2
<b>Temperature range</b>	G35IH135DLF2
<b>Package</b>	TO-247 long leads
<b>Packing</b>	Tube

# 1 Electrical ratings

**Table 1. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{CES}$	Gate-source voltage	1350	V
$I_C$	Continuous collector current at $T_C = 25\text{ °C}$	70	A
	Continuous collector current at $T_C = 100\text{ °C}$	35	
$I_{CP}^{(1)}$	Pulsed collector current	140	A
$V_{GE}$	Gate-emitter voltage	$\pm 20$	V
$I_F$	Continuous forward current at $T_C = 25\text{ °C}$	70	A
	Continuous forward current at $T_C = 100\text{ °C}$	35	
$I_{FP}^{(1)}$	Pulsed forward current	140	A
$P_{TOT}$	Total power dissipation at $T_C = 25\text{ °C}$	365	W
$T_{stg}$	Storage temperature range	-55 to 150	$^{\circ}\text{C}$
$T_J$	Operating junction temperature range	-55 to 175	$^{\circ}\text{C}$

1. Pulse width is limited by maximum junction temperature.

**Table 2. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thJC}$	Thermal resistance junction-case IGBT	0.41	$^{\circ}\text{C/W}$
	Thermal resistance junction-case diode	1.47	
$R_{thJA}$	Thermal resistance junction-ambient	50	

## 2 Electrical characteristics

$T_C = 25\text{ }^\circ\text{C}$  unless otherwise specified

**Table 3. Static characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)CES}$	Collector-emitter breakdown voltage	$V_{GE} = 0\text{ V}, I_C = 1\text{ mA}$	1350			V
$V_{CE(sat)}$	Collector-emitter saturation voltage	$V_{GE} = 15\text{ V}, I_C = 30\text{ A}$		1.75		V
		$V_{GE} = 15\text{ V}, I_C = 30\text{ A}, T_J = 125\text{ }^\circ\text{C}$		1.95		
		$V_{GE} = 15\text{ V}, I_C = 30\text{ A}, T_J = 175\text{ }^\circ\text{C}$		2.05		
		$V_{GE} = 15\text{ V}, I_C = 60\text{ A}$		2.30		
$V_F$	Forward on-voltage	$I_F = 30\text{ A}$		1.20		V
		$I_F = 30\text{ A}, T_J = 125\text{ }^\circ\text{C}$		1.20		
		$I_F = 30\text{ A}, T_J = 175\text{ }^\circ\text{C}$		1.25		
		$I_F = 60\text{ A}$		1.55		
$V_{GE(th)}$	Gate threshold voltage	$V_{CE} = V_{GE}, I_C = 1\text{ mA}$	5	6	7	V
$I_{CES}$	Collector cut-off current	$V_{GE} = 0\text{ V}, V_{CE} = 1350\text{ V}$			25	$\mu\text{A}$
$I_{GES}$	Gate-emitter leakage current	$V_{CE} = 0\text{ V}, V_{GE} = \pm 20\text{ V}$			$\pm 250$	nA

**Table 4. Dynamic characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{ies}$	Input capacitance	$V_{CE} = 25\text{ V}, f = 1\text{ MHz}, V_{GE} = 0\text{ V}$	-	3140	-	pF
$C_{oes}$	Output capacitance		-	125	-	pF
$C_{res}$	Reverse transfer capacitance		-	77	-	pF
$Q_g$	Total gate charge	$V_{CC} = 600\text{ V}, I_C = 30\text{ A},$	-	255	-	nC
$Q_{ge}$	Gate-emitter charge	$V_{GE} = 0\text{ to }15\text{ V}$	-	30	-	nC
$Q_{gc}$	Gate-collector charge	(see Figure 3. Gate charge test circuit)	-	124	-	nC

**Table 5. Switching characteristics (inductive load)**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off delay time	$V_{CC} = 600\text{ V}, I_C = 30\text{ A}, R_G = 10\text{ }\Omega, V_{GE} = 15\text{ V}$ (see Figure 1. Test circuit for inductive load switching)	-	252	-	ns
$t_f$	Current fall time		-	111	-	ns
$E_{off}^{(1)}$	Turn-off switching energy		-	1.42	-	mJ

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off delay time	$V_{CC} = 600\text{ V}$ , $I_C = 30\text{ A}$ , $R_G = 10\ \Omega$ , $V_{GE} = 15\text{ V}$ , $T_J = 175\text{ }^\circ\text{C}$ (see <a href="#">Figure 1. Test circuit for inductive load switching</a> )	-	300	-	ns
$t_f$	Current fall time		-	247	-	ns
$E_{off}^{(1)}$	Turn-off switching energy		-	2.46	-	$\mu\text{J}$

1. Including the tail of the collector current.

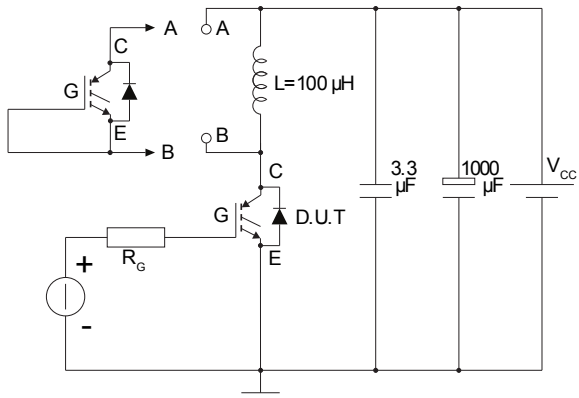
**Table 6. IGBT switching characteristics (snubbed inductive load)**

Symbol	Parameter	Test conditions <sup>(1)</sup>	Min.	Typ.	Max.	Unit
$E_{off}^{(2)}$	Turn-off switching energy	$V_{CC} = 900\text{ V}$ , $R_G = 10\ \Omega$ , $I_C = 60\text{ A}$ , $L = 500\ \mu\text{H}$ , $C_{snub} = 330\text{ nF}$	-	0.95	-	mJ
		$V_{CC} = 900\text{ V}$ , $R_G = 10\ \Omega$ , $I_C = 60\text{ A}$ , $L = 500\ \mu\text{H}$ , $C_{snub} = 330\text{ nF}$ , $T_J = 175\text{ }^\circ\text{C}$	-	1.87	-	

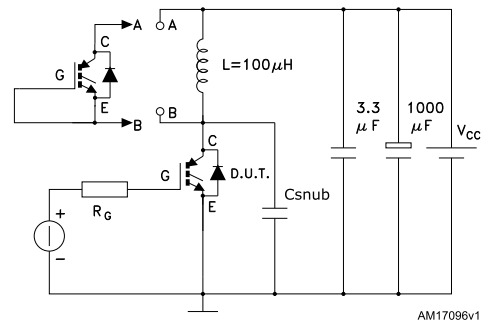
1. See [Figure 2. Test circuit for snubbed inductive load switching](#)

2. Including the tail of the collector current.

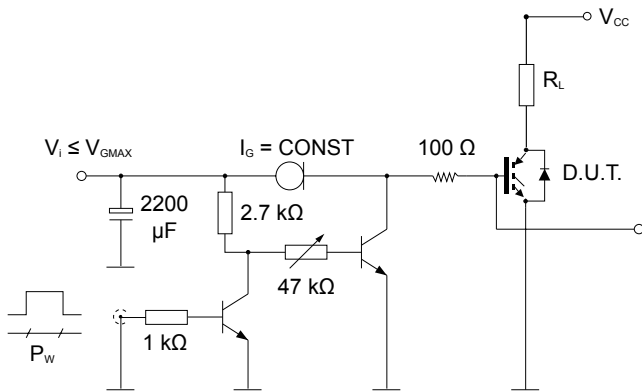
### 3 Test circuits

**Figure 1. Test circuit for inductive load switching**


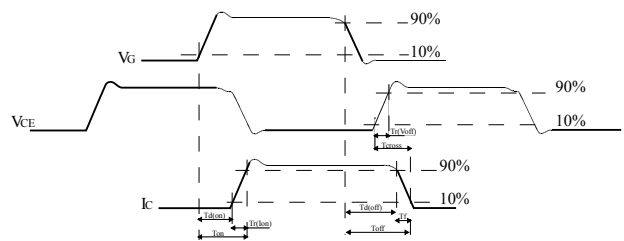
AM01504v1

**Figure 2. Test circuit for snubbed inductive load switching**


AM17096v1

**Figure 3. Gate charge test circuit**


GADG160420181048IG

**Figure 4. Switching waveform**


AM01506v1

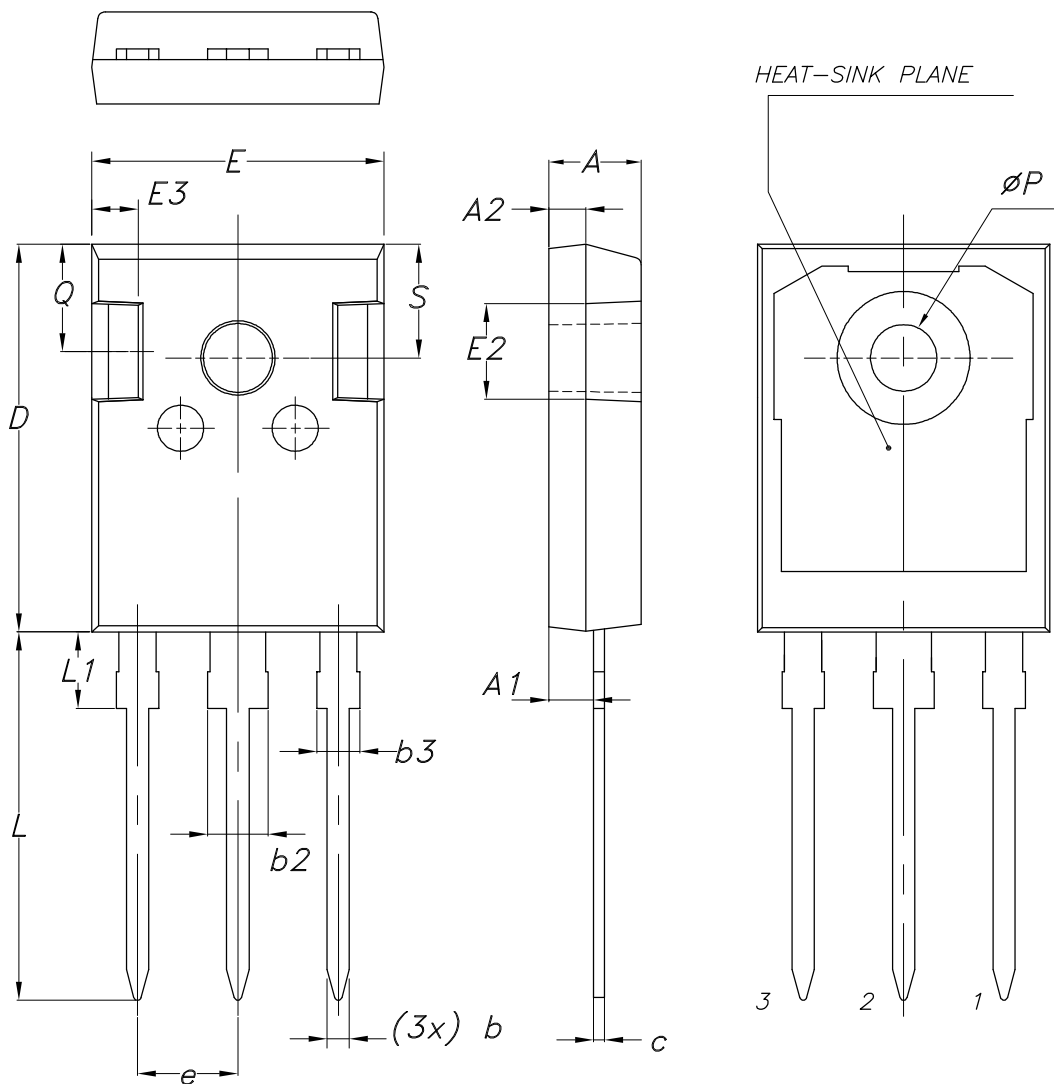
Prerelease product(s)

## 4 Package information

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](http://www.st.com). ECOPACK® is an ST trademark.

### 4.1 TO-247 long leads package information

Figure 5. TO-247 long leads package outline



8463846\_2\_F

Prerelease product(s)

**Table 7. TO-247 long leads package mechanical data**

Dim.	mm		
	Min.	Typ.	Max.
A	4.90	5.00	5.10
A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
b	1.16		1.26
b2			3.25
b3			2.25
c	0.59		0.66
D	20.90	21.00	21.10
E	15.70	15.80	15.90
E2	4.90	5.00	5.10
E3	2.40	2.50	2.60
e	5.34	5.44	5.54
L	19.80	19.92	20.10
L1			4.30
P	3.50	3.60	3.70
Q	5.60		6.00
S	6.05	6.15	6.25

Prerelease product(s)

## Revision history

**Table 8. Document revision history**

Date	Version	Changes
19-Apr-2018	1	Initial release. The document status is preliminary data.



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