

# Enhancement Mode N-Channel IGBT

## Features

- ◆ Advanced technology
- ◆ Excellent conduction and switching loss
- ◆ Excellent stability and uniformity

## Applications

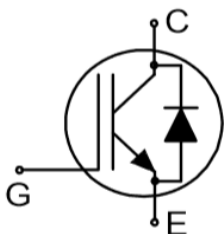
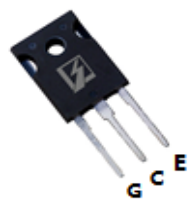
- ◆ Induction heating
- ◆ Soft switching applications

## ■ General Description

OST20N135HRF uses advanced Oriental-Semi's patented technology to provide extremely low  $V_{CE(sat)}$ , low gate charge, and excellent switching performance. This device is suitable for resonant induction heating applications.

◆ $V_{CES, min}$	1350 V
◆ $I_{C, pulse}$	60 A
◆ $V_{CE(sat)}@V_{GE}=15 V$	1.8 V
◆ $Q_g$	71.5 nC

## ■ Schematic and Package Information

<b>Schematic Diagram</b> 	<b>Pin Assignment-Top View</b>  <b>TO247</b> <b>OST20N135HRF</b>
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## ■ Absolute Maximum Ratings at $T_j=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Value	Unit
Collector emitter voltage	$V_{CES}$	1350	V
Gate emitter voltage	$V_{GES}$	$\pm 20$	V
Transient Gate emitter voltage, $T_P \leq 10\mu\text{s}$ , $D < 0.01$		$\pm 30$	V
Continuous collector current <sup>1)</sup> , $T_C=25^\circ\text{C}$	$I_C$	40	A
Continuous collector current <sup>1)</sup> , $T_C=100^\circ\text{C}$		20	
Pulsed collector current <sup>2)</sup> , $T_C=25^\circ\text{C}$	$I_{C, pulse}$	60	A
Diode forward current <sup>1)</sup> , $T_C=25^\circ\text{C}$	$I_F$	40	A
Diode forward current <sup>1)</sup> , $T_C=100^\circ\text{C}$		20	
Diode pulsed current <sup>2)</sup> , $T_C=25^\circ\text{C}$	$I_{F, pulse}$	60	A
Power dissipation <sup>3)</sup> , $T_C=25^\circ\text{C}$	$P_D$	290	W
Power dissipation <sup>3)</sup> , $T_C=100^\circ\text{C}$		145	W
Operation and storage temperature	$T_{stg}, T_j$	-55 to 150	$^\circ\text{C}$

## ■ Thermal Characteristics

Parameter	Symbol	Value	Unit
IGBT thermal resistance, junction-case	$R_{\theta JC}$	0.43	$^{\circ}\text{C}/\text{W}$
Diode thermal resistance, junction-case	$R_{\theta JC}$	0.43	$^{\circ}\text{C}/\text{W}$
Thermal resistance, junction-ambient <sup>4)</sup>	$R_{\theta JA}$	40	$^{\circ}\text{C}/\text{W}$

## ■ Electrical Characteristics at $T_j=25^{\circ}\text{C}$ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Collector-emitter breakdown voltage	$V_{(BR)CES}$	1350			V	$V_{GE}=0\text{ V}, I_C=0.5\text{ mA}$
Collector-emitter saturation voltage	$V_{CE(sat)}$		1.8	2.2	V	$V_{GE}=15\text{ V}, T_j=25^{\circ}\text{C}$
				2.5	V	$V_{GE}=15\text{ V}, T_j=150^{\circ}\text{C}$
Gate-emitter threshold voltage	$V_{GE(th)}$	5.1	5.8	6.4	V	$V_{CE}=V_{GE}, I_D=0.5\text{ mA}$
Diode forward voltage	$V_F$		1.5	1.7	V	$V_{GE}=0\text{ V}, I_F=20\text{ A}$
			1.9			$V_{GE}=0\text{ V}, I_F=20\text{ A}, T_j=150^{\circ}\text{C}$
Gate-emitter leakage current	$I_{GES}$			100	nA	$V_{CE}=0\text{ V}, V_{GE}=20\text{ V}$
Zero gate voltage collector current	$I_{CES}$			10	$\mu\text{A}$	$V_{CE}=1350\text{ V}, V_{GE}=0\text{ V}$

## ■ Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	$C_{ies}$		3907		pF	$V_{CE}=25\text{ V}, V_{GE}=0\text{ V}, f=100\text{ KHz}$
Output capacitance	$C_{oes}$		51.3		pF	
Reverse transfer capacitance	$C_{res}$		2.6		pF	
Turn-on delay time	$t_{d(on)}$		48		ns	$V_{CC}=600\text{ V}, I_C=20\text{ A}, V_{GE}=15\text{ V}, R_G=10\ \Omega$
Turn-off delay time	$t_{d(off)}$		144		ns	
Fall time	$t_f$		235		ns	
Turn-off energy	$E_{off}$		1.0		mJ	

## ■ Gate Charge Characteristics

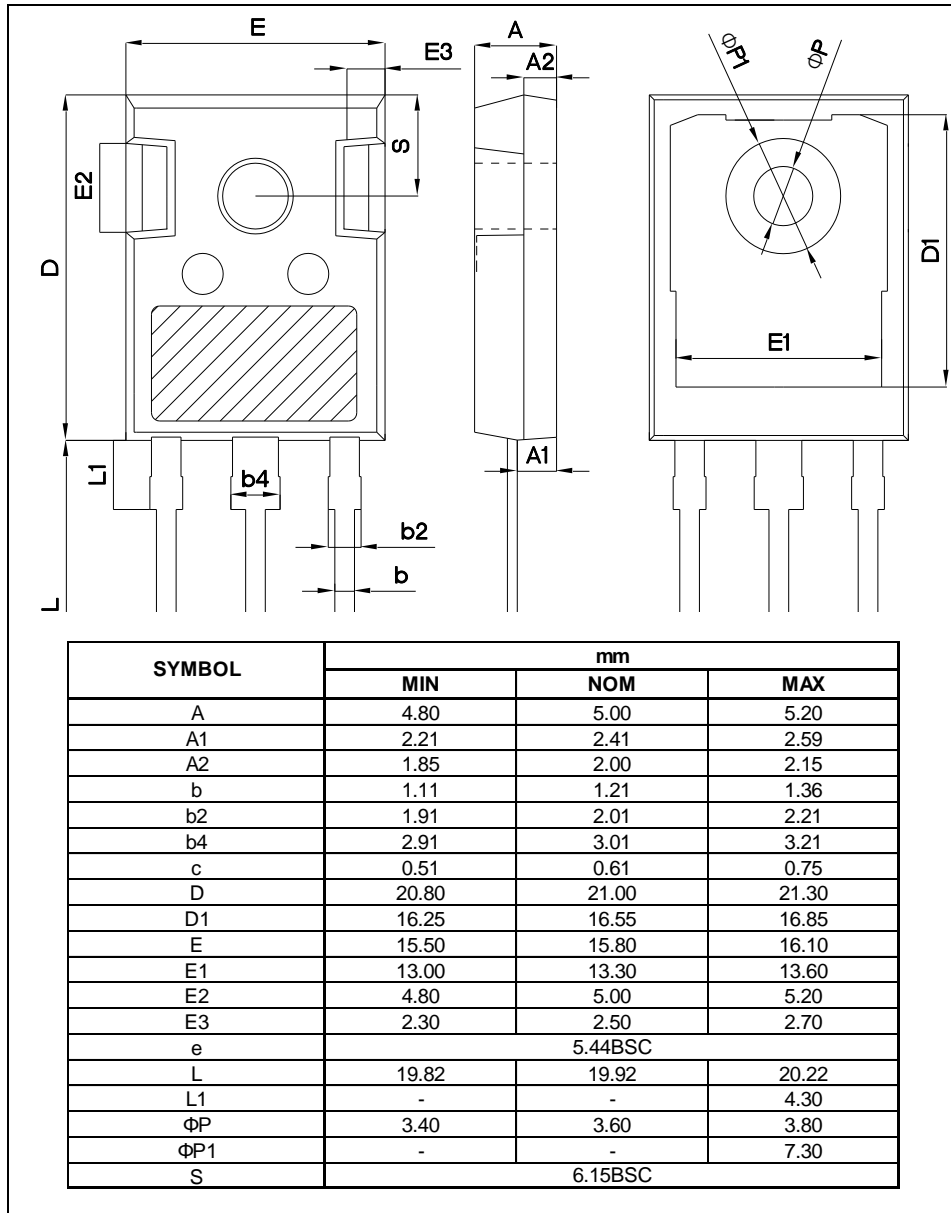
Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	$Q_g$			120	nC	$I_C=20\text{ A}$ , $V_{CC}=1080\text{ V}$ , $V_{GE}=15\text{ V}$
Gate-emitter charge	$Q_{ge}$				nC	
Gate-collector charge	$Q_{gc}$				nC	

## ■ Note

- 1) Calculated continuous current based on maximum allowable junction temperature.
- 2) Repetitive rating, pulse width limited by maximum junction temperature.
- 3)  $P_d$  is based on maximum junction temperature, using junction-case thermal resistance.
- 4) The value of  $R_{\theta JA}$  is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with  $T_a=25\text{ }^\circ\text{C}$
- 5) This datasheet is preliminary version, it is for reference only.

■ Package Information

Outside view: TO247 package



## ■ Ordering Information

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Package	Units/Tube	Tubes/Inner Box	Units/Inner Box	Inner Box/Carton Box	Units/Carton Box
TO247	30	11	330	6	1980

## ■ Product Information

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Product	Package	Pb Free	RoHS	Halogen Free
OST20N135HRF	TO247	yes	yes	yes