

## TRENCHSTOP™ Advanced Isolation

## Maximum Ratings

For optimum lifetime and reliability, Infineon recommends operating conditions that do not exceed 80% of the maximum ratings stated in this datasheet.

Parameter	Symbol	Value	Unit
Collector-emitter voltage, $T_{vj} \geq 25^{\circ}\text{C}$	$V_{CE}$	600	V
DC collector current, limited by $T_{vjmax}$ $T_h = 25^{\circ}\text{C}$ value limited by bondwire $T_h = 65^{\circ}\text{C}$ $T_h = 65^{\circ}\text{C}$	$I_C$	40.0 37.0 60.0 <sup>1)</sup>	A
Pulsed collector current, $t_p$ limited by $T_{vjmax}$	$I_{Cpuls}$	120.0	A
Turn off safe operating area $V_{CE} \leq 600\text{V}$ , $T_{vj} \leq 175^{\circ}\text{C}$ , $t_p = 1\mu\text{s}$	-	120.0	A
Diode forward current, limited by $T_{vjmax}$ $T_h = 25^{\circ}\text{C}$ value limited by bondwire $T_h = 65^{\circ}\text{C}$	$I_F$	40.0 29.0	A
Diode pulsed current, $t_p$ limited by $T_{vjmax}$	$I_{Fpuls}$	120.0	A
Gate-emitter voltage Transient Gate-emitter voltage ( $t_p \leq 10\mu\text{s}$ , $D < 0.010$ )	$V_{GE}$	$\pm 20$ $\pm 30$	V
Short circuit withstand time $V_{GE} = 15.0\text{V}$ , $V_{CC} \leq 400\text{V}$ Allowed number of short circuits < 1000 Time between short circuits: $\geq 1.0\text{s}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{SC}$	5	$\mu\text{s}$
Power dissipation $T_h = 25^{\circ}\text{C}$ Power dissipation $T_h = 65^{\circ}\text{C}$	$P_{tot}$	130.0 95.0	W
Operating junction temperature	$T_{vj}$	-40...+175	$^{\circ}\text{C}$
Storage temperature	$T_{stg}$	-55...+150	$^{\circ}\text{C}$
Soldering temperature, wave soldering 1.6mm (0.063in.) from case for 10s		260	$^{\circ}\text{C}$
Mounting torque, M3 screw Maximum of mounting processes: 3	$M$	0.6	Nm
Isolation voltage RMS, $f = 50/60\text{Hz}$ , $t = 1\text{min}^{2)}$	$V_{isol}$	2500	V

## Thermal Resistance

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
<b>R<sub>th</sub> Characteristics</b>						
IGBT thermal resistance, <sup>3)</sup> junction - heatsink	$R_{th(j-h)}$		-	0.98	1.15	K/W
Diode thermal resistance, <sup>3)</sup> junction - heatsink	$R_{th(j-h)}$		-	1.96	2.16	K/W
Thermal resistance junction - ambient	$R_{th(j-a)}$		-	-	65	K/W

<sup>1)</sup> Equivalent current rating in TO-247-3 at  $T_h = 65^{\circ}\text{C}$  using reference insulation material: 152 $\mu\text{m}$ , 0.9 W/mK, standard polyimide based reinforced carrier insulator

<sup>2)</sup> For a proper handling and assembly of the advanced isolation device in the application refer to the note at the package drawing.

<sup>3)</sup> At force on body  $F = 500\text{N}$ ,  $T_a = 25^{\circ}\text{C}$

## TRENCHSTOP™ Advanced Isolation

Electrical Characteristic, at  $T_{vj} = 25^{\circ}\text{C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
<b>Static Characteristic</b>						
Collector-emitter breakdown voltage	$V_{(BR)CES}$	$V_{GE} = 0\text{V}, I_C = 0.50\text{mA}$	600	-	-	V
Collector-emitter saturation voltage	$V_{CEsat}$	$V_{GE} = 15.0\text{V}, I_C = 40.0\text{A}$ $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 175^{\circ}\text{C}$	- -	2.20 2.80	2.70 -	V
Diode forward voltage	$V_F$	$V_{GE} = 0\text{V}, I_F = 20.0\text{A}$ $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 175^{\circ}\text{C}$	- -	1.50 1.45	1.90 -	V
Gate-emitter threshold voltage	$V_{GE(th)}$	$I_C = 0.43\text{mA}, V_{CE} = V_{GE}$	4.1	5.1	5.7	V
Zero gate voltage collector current	$I_{CES}$	$V_{CE} = 600\text{V}, V_{GE} = 0\text{V}$ $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 175^{\circ}\text{C}$	- -	- 440	40 -	$\mu\text{A}$
Gate-emitter leakage current	$I_{GES}$	$V_{CE} = 0\text{V}, V_{GE} = 20\text{V}$	-	-	100	nA
Transconductance	$g_{fs}$	$V_{CE} = 20\text{V}, I_C = 40.0\text{A}$	-	15.0	-	S

Electrical Characteristic, at  $T_{vj} = 25^{\circ}\text{C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
<b>Dynamic Characteristic</b>						
Input capacitance	$C_{ies}$	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$	-	1704	-	pF
Output capacitance	$C_{oes}$		-	73	-	
Reverse transfer capacitance	$C_{res}$		-	48	-	
Gate charge	$Q_G$	$V_{CC} = 480\text{V}, I_C = 40.0\text{A},$ $V_{GE} = 15\text{V}$	-	160.0	-	nC
Internal emitter inductance measured 5mm (0.197 in.) from case	$L_E$		-	13.0	-	nH
Short circuit collector current Max. 1000 short circuits Time between short circuits: $\geq 1.0\text{s}$	$I_{C(SC)}$	$V_{GE} = 15.0\text{V}, V_{CC} \leq 400\text{V},$ $t_{SC} \leq 5\mu\text{s}$ $T_{vj} = 150^{\circ}\text{C}$	-	166	-	A

## Switching Characteristic, Inductive Load

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
<b>IGBT Characteristic, at <math>T_{vj} = 25^{\circ}\text{C}</math></b>						
Turn-on delay time	$t_{d(on)}$	$T_{vj} = 25^{\circ}\text{C},$ $V_{CC} = 400\text{V}, I_C = 40.0\text{A},$ $V_{GE} = 0.0/15.0\text{V},$ $R_{G(on)} = 8.0\Omega, R_{G(off)} = 8.0\Omega,$ $L\sigma = 75\text{nH}, C\sigma = 30\text{pF}$ $L\sigma, C\sigma$ from Fig. E Energy losses include "tail" and diode reverse recovery.	-	21	-	ns
Rise time	$t_r$		-	39	-	ns
Turn-off delay time	$t_{d(off)}$		-	174	-	ns
Fall time	$t_f$		-	18	-	ns
Turn-on energy	$E_{on}$		-	1.28	-	mJ
Turn-off energy	$E_{off}$		-	0.56	-	mJ
Total switching energy	$E_{ts}$		-	1.84	-	mJ