

TRENCHSTOP™ RC-Series for hard switching applications

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} $T_c = 25^{\circ}\text{C}$ $T_c = 100^{\circ}\text{C}$	I_C	18.8 12.6	A
Pulsed collector current, t_p limited by T_{vjmax}	I_{Cpuls}	30.0	A
Turn off safe operating area $V_{CE} \leq 600\text{V}$, $T_{vj} \leq 175^{\circ}\text{C}$, $t_p = 1\mu\text{s}$	-	30.0	A
Diode forward current, limited by T_{vjmax} $T_c = 25^{\circ}\text{C}$ $T_c = 100^{\circ}\text{C}$	I_F	8.9 4.6	A
Diode pulsed current, t_p limited by T_{vjmax}	I_{Fpuls}	30.0	A
Gate-emitter voltage Transient Gate-emitter voltage ($t_p \leq 10\mu\text{s}$, $D < 0.010$)	V_{GE}	± 20 ± 25	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}	3	μs
Power dissipation $T_c = 25^{\circ}\text{C}$ Power dissipation $T_c = 100^{\circ}\text{C}$	P_{tot}	79.0 39.5	W
Operating junction temperature	T_{vj}	-40...+175	$^{\circ}\text{C}$
Storage temperature	T_{stg}	-55...+150	$^{\circ}\text{C}$
Soldering temperature, reflow soldering (MSL1 according to JEDEC J-STA-020)		260	$^{\circ}\text{C}$

Thermal Resistance

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	

R_{th} Characteristics

IGBT thermal resistance, ¹⁾ junction - case	$R_{th(j-c)}$		-	-	1.90	K/W
Diode thermal resistance, ²⁾ junction - case	$R_{th(j-c)}$		-	-	6.10	K/W
Thermal resistance, min. footprint junction - ambient	$R_{th(j-a)}$		-	-	75	K/W
Thermal resistance, 6cm ² Cu on PCB junction - ambient	$R_{th(j-a)}$		-	-	50	K/W

¹⁾ R_{th}/Z_{th} based on single cooling pulse. Please be aware that a correct R_{th} measurement of the IGBT, is not possible using a thermocouple.

²⁾ R_{th}/Z_{th} based on single cooling pulse. Please be aware that a correct R_{th} measurement of the Diode, is not possible using a thermocouple.

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

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Static Characteristic						
Collector-emitter saturation voltage	V_{CEsat}	$V_{GE} = 15.0\text{V}$, $I_C = 10.0\text{A}$ $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 175^{\circ}\text{C}$	- -	2.00 2.40	2.30 -	V
Diode forward voltage	V_F	$V_{GE} = 0\text{V}$, $I_F = 10.0\text{A}$ $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 175^{\circ}\text{C}$	- -	1.90 1.95	2.20 -	V
Gate-emitter threshold voltage	$V_{GE(th)}$	$I_C = 0.11\text{mA}$, $V_{CE} = V_{GE}$	4.3	5.0	5.7	V
Zero gate voltage collector current	I_{CES}	$V_{CE} = 600\text{V}$, $V_{GE} = 0\text{V}$ $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 175^{\circ}\text{C}$	- -	- -	25 2500	μA
Gate-emitter leakage current	I_{GES}	$V_{CE} = 0\text{V}$, $V_{GE} = 20\text{V}$	-	-	100	nA
Transconductance	g_{fs}	$V_{CE} = 20\text{V}$, $I_C = 10.0\text{A}$	-	4.5	-	S
Integrated gate resistor	r_G			none		Ω

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

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Dynamic Characteristic						
Input capacitance	C_{ies}	$V_{CE} = 25\text{V}$, $V_{GE} = 0\text{V}$ $f = 1000\text{kHz}$	-	400	-	μF
Output capacitance	C_{oes}		-	20	-	
Reverse transfer capacitance	C_{res}		-	15	-	
Gate charge	Q_G	$V_{CC} = 480\text{V}$, $I_C = 10.0\text{A}$, $V_{GE} = 15\text{V}$	-	48.0	-	nC

Switching Characteristic, Inductive Load

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	

IGBT Characteristic, at $T_{vj} = 25^{\circ}\text{C}$

Turn-on delay time	$t_{d(on)}$	$T_{vj} = 25^{\circ}\text{C}$, $V_{CC} = 400\text{V}$, $I_C = 10.0\text{A}$, $V_{GE} = 0.0/15.0\text{V}$, $R_{G(on)} = 49.0\Omega$, $R_{G(off)} = 49.0\Omega$, $L\sigma = 30\text{nH}$, $C\sigma = 32\text{pF}$ $L\sigma$, $C\sigma$ from Fig. E Energy losses include "tail" and diode reverse recovery.	-	14	-	ns
Rise time	t_r		-	13	-	ns
Turn-off delay time	$t_{d(off)}$		-	250	-	ns
Fall time	t_f		-	21	-	ns
Turn-on energy	E_{on}		-	0.32	-	mJ
Turn-off energy	E_{off}		-	0.17	-	mJ
Total switching energy	E_{ts}		-	0.49	-	mJ