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, $T_{vj} \geq 25°C$	V_{CE}	600	V
DC collector current, limited by T_{vjmax} $T_h = 25°C$ $T_h = 65°C$ $T_h = 65°C$	I_C	53.0 44.0 74.0[1)]	A
Pulsed collector current, t_p limited by T_{vjmax}	I_{Cpuls}	150.0	A
Turn off safe operating area $V_{CE} \leq 600V$, $T_{vj} \leq 175°C$, $t_p = 1\mu s$	-	150.0	A
Diode forward current, limited by T_{vjmax} $T_h = 25°C$ value limited by bondwire $T_h = 65°C$	I_F	40.0 32.0	A
Diode pulsed current, t_p limited by T_{vjmax}	I_{Fpuls}	150.0	A
Gate-emitter voltage Transient Gate-emitter voltage ($t_p \leq 10\mu s$, $D < 0.010$)	V_{GE}	±20 ±30	V
Short circuit withstand time $V_{GE} = 15.0V$, $V_{CC} \leq 400V$ Allowed number of short circuits < 1000 Time between short circuits: ≥ 1.0s $T_{vj} = 150°C$	t_{SC}	5	µs
Power dissipation $T_h = 25°C$ Power dissipation $T_h = 65°C$	P_{tot}	141.0 104.0	W
Operating junction temperature	T_{vj}	-40...+175	°C
Storage temperature	T_{stg}	-55...+150	°C
Soldering temperature, wave soldering 1.6mm (0.063in.) from case for 10s		260	°C
Mounting torque, M3 screw Maximum of mounting processes: 3	M	0.6	Nm
Isolation voltage RMS, f = 50/60Hz, t = 1min[2)]	V_{isol}	2500	V

Thermal Resistance

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
R_{th} Characteristics						
IGBT thermal resistance,[3)] junction - heatsink	$R_{th(j-h)}$		-	0.90	1.06	K/W
Diode thermal resistance,[3)] junction - heatsink	$R_{th(j-h)}$		-	1.75	1.96	K/W
Thermal resistance junction - ambient	$R_{th(j-a)}$		-	-	65	K/W

[1)] Equivalent current rating in TO-247-3 at $T_h = 65°C$ using reference insulation material: 152µm, 0.9 W/mK, standard polyimide based reinforced carrier insulator
[2)] For a proper handling and assembly of the advanced isolation device in the application refer to the note at the package drawing.
[3)] At force on body F = 500N, $T_a = 25°C$

Electrical Characteristic, at T_{vj} = 25°C, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Static Characteristic						
Collector-emitter breakdown voltage	$V_{(BR)CES}$	V_{GE} = 0V, I_C = 0.50mA	600	-	-	V
Collector-emitter saturation voltage	V_{CEsat}	V_{GE} = 15.0V, I_C = 50.0A T_{vj} = 25°C T_{vj} = 175°C	- -	2.20 2.80	2.70 -	V
Diode forward voltage	V_F	V_{GE} = 0V, I_F = 25.0A T_{vj} = 25°C T_{vj} = 175°C	- -	1.50 1.45	1.90 -	V
Gate-emitter threshold voltage	$V_{GE(th)}$	I_C = 0.58mA, V_{CE} = V_{GE}	4.1	5.1	5.7	V
Zero gate voltage collector current	I_{CES}	V_{CE} = 600V, V_{GE} = 0V T_{vj} = 25°C T_{vj} = 175°C	- -	- 600	40 -	µA
Gate-emitter leakage current	I_{GES}	V_{CE} = 0V, V_{GE} = 20V	-	-	100	nA
Transconductance	g_{fs}	V_{CE} = 20V, I_C = 50.0A	-	19.0	-	S

Electrical Characteristic, at T_{vj} = 25°C, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Dynamic Characteristic						
Input capacitance	C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz	-	2301	-	pF
Output capacitance	C_{oes}		-	98	-	
Reverse transfer capacitance	C_{res}		-	67	-	
Gate charge	Q_G	V_{CC} = 480V, I_C = 50.0A, V_{GE} = 15V	-	210.0	-	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: ≥ 1.0s	$I_{C(SC)}$	V_{GE} = 15.0V, V_{CC} ≤ 400V, t_{SC} ≤ 5µs T_{vj} = 150°C	-	245	-	A

Switching Characteristic, Inductive Load

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
IGBT Characteristic, at T_{vj} = 25°C						
Turn-on delay time	$t_{d(on)}$	T_{vj} = 25°C, V_{CC} = 400V, I_C = 50.0A, V_{GE} = 0.0/15.0V, $R_{G(on)}$ = 7.0Ω, $R_{G(off)}$ = 7.0Ω, $L\sigma$ = 75nH, $C\sigma$ = 30pF $L\sigma$, $C\sigma$ from Fig. E Energy losses include "tail" and diode reverse recovery.	-	23	-	ns
Rise time	t_r		-	39	-	ns
Turn-off delay time	$t_{d(off)}$		-	170	-	ns
Fall time	t_f		-	19	-	ns
Turn-on energy	E_{on}		-	1.57	-	mJ
Turn-off energy	E_{off}		-	0.72	-	mJ
Total switching energy	E_{ts}		-	2.29	-	mJ