

**Thermal Resistance**

Parameter	Symbol	Conditions	Max. Value	Unit
<b>Characteristic</b>				
IGBT thermal resistance, junction – case	$R_{thJC}$		0.45	K/W
Diode thermal resistance, junction – case	$R_{thJCD}$		0.81	
Thermal resistance, junction – ambient	$R_{thJA}$		40	

**Electrical Characteristic, at  $T_j = 25\text{ °C}$ , unless otherwise specified**

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
<b>Static Characteristic</b>						
Collector-emitter breakdown voltage	$V_{(BR)CES}$	$V_{GE}=0V, I_C=1.5mA$	1200	-	-	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	$V_{GE} = 15V, I_C=40A$ $T_j=25\text{ °C}$ $T_j=125\text{ °C}$ $T_j=150\text{ °C}$	- - -	1.7 2.1 2.3	2.3 - -	
Diode forward voltage	$V_F$	$V_{GE}=0V, I_F=40A$ $T_j=25\text{ °C}$ $T_j=125\text{ °C}$ $T_j=150\text{ °C}$	- - -	1.75 1.75 1.75	2.3 - -	
Gate-emitter threshold voltage	$V_{GE(th)}$	$I_C=1.5mA, V_{CE}=V_{GE}$	5.0	5.8	6.5	
Zero gate voltage collector current	$I_{CES}$	$V_{CE}=1200V, V_{GE}=0V$ $T_j=25\text{ °C}$ $T_j=150\text{ °C}$	- -	- -	0.4 4.0	mA
Gate-emitter leakage current	$I_{GES}$	$V_{CE}=0V, V_{GE}=20V$	-	-	600	
Transconductance	$g_{fs}$	$V_{CE}=20V, I_C=40A$	-	21	-	S
Integrated gate resistor	$R_{Gint}$			6		$\Omega$

**Dynamic Characteristic**

Input capacitance	$C_{iss}$	$V_{CE}=25V,$	-	2500	-	pF
Output capacitance	$C_{oss}$	$V_{GE}=0V,$	-	130	-	
Reverse transfer capacitance	$C_{rss}$	$f=1MHz$	-	110	-	
Gate charge	$Q_{Gate}$	$V_{CC}=960V, I_C=40A$ $V_{GE}=15V$	-	203	-	nC
Internal emitter inductance measured 5mm (0.197 in.) from case	$L_E$		-	13	-	nH
Short circuit collector current <sup>1)</sup>	$I_{C(SC)}$	$V_{GE}=15V, t_{SC} \leq 10\mu s$ $V_{CC} = 600V,$ $T_j = 25^\circ C$	-	210	-	A

**Switching Characteristic, Inductive Load, at  $T_j=25^\circ C$** 

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	

**IGBT Characteristic**

Turn-on delay time	$t_{d(on)}$	$T_j=25^\circ C,$ $V_{CC}=600V, I_C=40A,$ $V_{GE}=0/15V,$ $R_G=15\Omega,$ $L_\sigma^{2)}=180nH,$ $C_\sigma^{2)}=39pF$ Energy losses include "tail" and diode reverse recovery.	-	48	-	ns
Rise time	$t_r$		-	34	-	
Turn-off delay time	$t_{d(off)}$		-	480	-	
Fall time	$t_f$		-	70	-	mJ
Turn-on energy	$E_{on}$		-	3.3	-	
Turn-off energy	$E_{off}$		-	3.2	-	
Total switching energy	$E_{ts}$		-	6.5	-	

**Anti-Parallel Diode Characteristic**

Diode reverse recovery time	$t_{rr}$	$T_j=25^\circ C,$	-	240	-	ns
Diode reverse recovery charge	$Q_{rr}$	$V_R=600V, I_F=40A,$	-	3.8	-	$\mu C$
Diode peak reverse recovery current	$I_{rrm}$	$di_F/dt=800A/\mu s$	-	28	-	A
Diode peak rate of fall of reverse recovery current during $t_b$	$di_{rr}/dt$		-	370	-	$A/\mu s$

<sup>1)</sup> Allowed number of short circuits: <1000; time between short circuits: >1s.

<sup>2)</sup> Leakage inductance  $L_\sigma$  and Stray capacity  $C_\sigma$  due to dynamic test circuit in Figure E.