Electrical Characteristics of the IGBT $T_{vj}=25℃$, unless otherwise noted

Parameter	Symbol	Test condition	Min.	Typ.	Max.	Unit
OFF						
Collector　Emitter Breakdown Voltage	BV_{CES}	$V_{GE} = 0V$, $I_C = 1mA$	650	--	--	V
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE} = 650V$, $V_{GE} = 0V$	--	--	1	mA
Gate　Emitter Leakage Current	I_{GES}	$V_{CE} = 0V$, $V_{GE} =$ 　20V	--	--	250	nA
Integrated Gate Resistance	$R_{G(int)}$	f = 1MHz, Open Collector	--	3.9	--	
ON						
Gate　Emitter Threshold Voltage	$V_{GE(TH)}$	$V_{GE} = V_{CE}$, $I_C = 40mA$	4.5	6.0	7.5	V
Collector　Emitter Saturation Voltage	$V_{CE(SAT)}$	$V_{GE} = 15V$, $I_C = 40A$, $T_{vj} = 25$	--	1.60	2.10	V
		$V_{GE} = 15V$, $I_C = 40A$, $T_{vj} = 125$	--	1.81	--	V
		$V_{GE} = 15V$, $I_C = 40A$, $T_{vj} = 175$	--	1.94	--	V
DYNAMIC						
Input Capacitance	C_{IES}	$V_{CE} = 30V$ $V_{GE} = 0V$ f = 1MHz	--	2274	--	pF
Output Capacitance	C_{OES}		--	114	--	pF
Reverse Transfer Capacitance	C_{RES}		--	72	--	pF
Total Gate Charge	Q_g	$V_{CC} = 400V$, $I_C = 40A$ $V_{GE} = 15V$	--	121	182	nC
Gate-Emitter Charge	Q_{ge}		--	15	22	nC
Gate-Collector Charge	Q_{gc}		--	59	89	nC
SWITCHING (Note 3)						
Turn-On Delay Time	$t_{d(on)}$	$V_{CC} = 400V$, $I_C = 20A$ $R_G = 5$, $V_{GE} = 15V$ Inductive Load, $T_{vj} = 25$	--	25	--	ns
Rise Time	t_r		--	18	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	126	--	ns
Fall Time	t_f		--	34	--	ns
Turn-On Switching Loss	E_{ON}		--	0.36	--	mJ
Turn-Off Switching Loss	E_{OFF}		--	0.26	--	mJ
Total Switching Loss	E_{TS}		--	0.62	--	mJ
Turn-On Delay Time	$t_{d(on)}$	$V_{CC} = 400V$, $I_C = 40A$ $R_G = 5$, $V_{GE} = 15V$ Inductive Load, $T_{vj} = 25$	--	28	--	ns
Rise Time	t_r		--	29	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	108	--	ns
Fall Time	t_f		--	37	--	ns
Turn-On Switching Loss	E_{ON}		--	1.06	1.59	mJ
Turn-Off Switching Loss	E_{OFF}		--	0.55	0.83	mJ
Total Switching Loss	E_{TS}		--	1.61	2.42	mJ