

Switching Characteristic, Inductive Load, at $T_j=25^\circ\text{C}$

Parameter	Symbol	Conditions	Value			Unit
			min.	Typ.	max.	
IGBT Characteristic						
Turn-on delay time	$t_{d(on)}$	$T_j=25^\circ\text{C}$, $V_{CC}=400\text{V}$, $I_C=20\text{A}$, $V_{GE}=0/15\text{V}$, $r_G=12\Omega$, $L_\sigma=131\text{nH}$, $C_\sigma=31\text{pF}$	-	18	-	ns
Rise time	t_r		-	14	-	
Turn-off delay time	$t_{d(off)}$		-	199	-	
Fall time	t_f		-	42	-	
Turn-on energy	E_{on}	L_σ , C_σ from Fig. E Energy losses include "tail" and diode reverse recovery.	-	0.31	-	mJ
Turn-off energy	E_{off}		-	0.46	-	
Total switching energy	E_{ts}		-	0.77	-	

Anti-Parallel Diode Characteristic

Diode reverse recovery time	t_{rr}	$T_j=25^\circ\text{C}$,	-	41	-	ns
Diode reverse recovery charge	Q_{rr}	$V_R=400\text{V}$, $I_F=20\text{A}$, $di_F/dt=880\text{A}/\mu\text{s}$	-	0.31	-	μC
Diode peak reverse recovery current	I_{rrm}		-	13.3	-	A
Diode peak rate of fall of reverse recovery current during t_b	di_{rr}/dt		-	711	-	$\text{A}/\mu\text{s}$

Switching Characteristic, Inductive Load, at $T_j=175^\circ\text{C}$

Parameter	Symbol	Conditions	Value			Unit
			min.	Typ.	max.	
IGBT Characteristic						
Turn-on delay time	$t_{d(on)}$	$T_j=175^\circ\text{C}$, $V_{CC}=400\text{V}$, $I_C=20\text{A}$, $V_{GE}=0/15\text{V}$, $r_G=12\Omega$, $L_\sigma=131\text{nH}$, $C_\sigma=31\text{pF}$	-	18	-	ns
Rise time	t_r		-	18	-	
Turn-off delay time	$t_{d(off)}$		-	223	-	
Fall time	t_f		-	76	-	
Turn-on energy	E_{on}	L_σ , C_σ from Fig. E Energy losses include "tail" and diode reverse recovery.	-	0.51	-	mJ
Turn-off energy	E_{off}		-	0.64	-	
Total switching energy	E_{ts}		-	1.15	-	

Anti-Parallel Diode Characteristic

Diode reverse recovery time	t_{rr}	$T_j=175^\circ\text{C}$	-	176	-	ns
Diode reverse recovery charge	Q_{rr}	$V_R=400\text{V}$, $I_F=20\text{A}$, $di_F/dt=880\text{A}/\mu\text{s}$	-	1.46	-	μC
Diode peak reverse recovery current	I_{rrm}		-	18.9	-	A
Diode peak rate of fall of reverse recovery current during t_b	di_{rr}/dt		-	467	-	$\text{A}/\mu\text{s}$

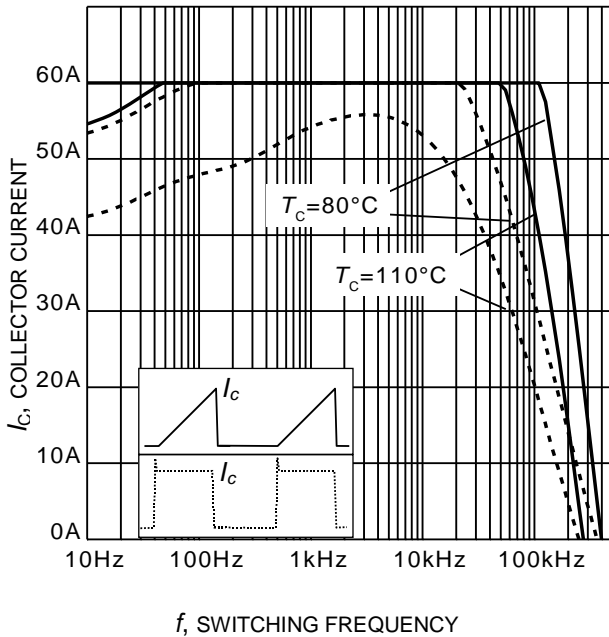


Figure 1. Collector current as a function of switching frequency
 ($T_j \leq 175^\circ\text{C}$, $D = 0.5$, $V_{CE} = 400\text{V}$,
 $V_{GE} = 0/15\text{V}$, $r_G = 12\Omega$)

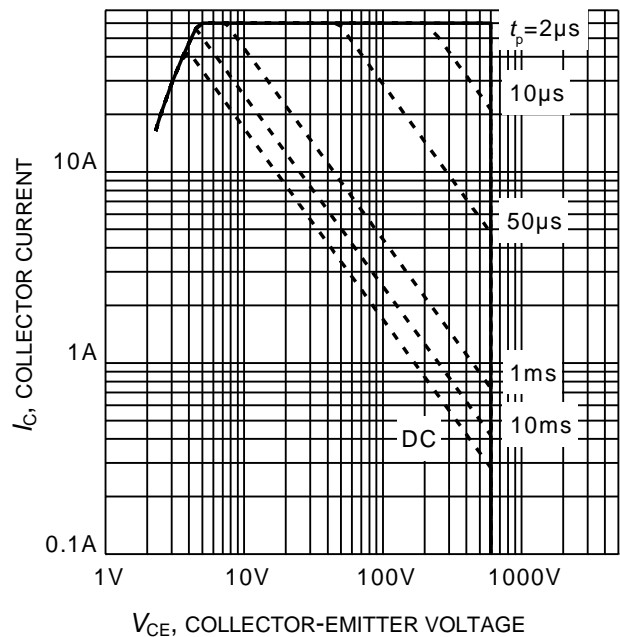


Figure 2. Safe operating area
 ($D = 0$, $T_C = 25^\circ\text{C}$, $T_j \leq 175^\circ\text{C}$;
 $V_{GE} = 0/15\text{V}$)

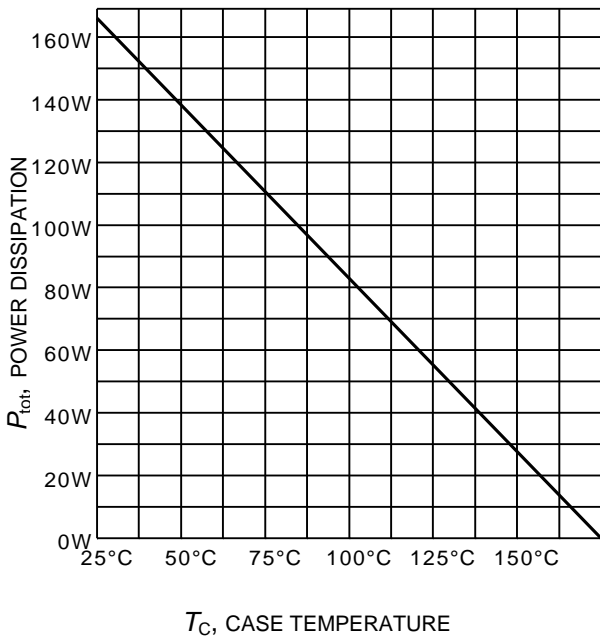


Figure 3. Power dissipation as a function of case temperature
 ($T_j \leq 175^\circ\text{C}$)

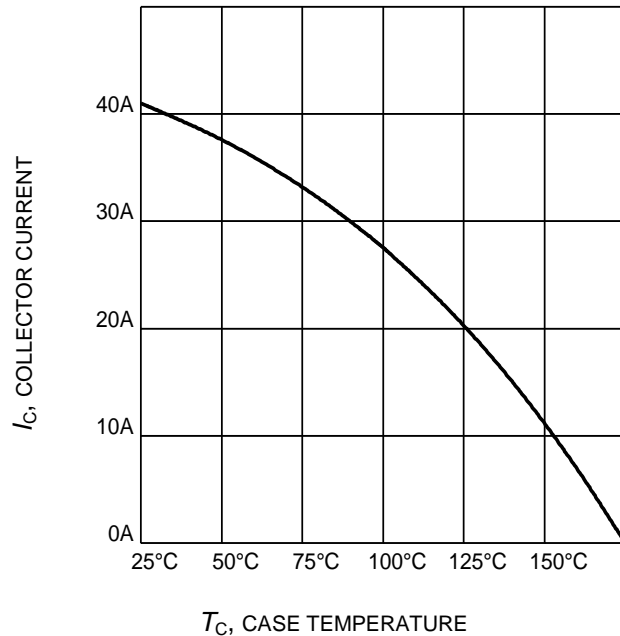


Figure 4. Collector current as a function of case temperature
 ($V_{GE} \geq 15\text{V}$, $T_j \leq 175^\circ\text{C}$)