

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

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
<b>IGBT Characteristic</b>						
Turn-on delay time	$t_{d(on)}$	$T_j=25^\circ\text{C}$ , $V_{CC}=400\text{V}$ , $I_C=75\text{A}$ , $V_{GE}=0/15\text{V}$ , $r_G=5\Omega$ , $L_\sigma=100\text{nH}$ , $C_\sigma=39\text{pF}$ $L_\sigma$ , $C_\sigma$ from Fig. E Energy losses include "tail" and diode reverse recovery.	-	33	-	ns
Rise time	$t_r$		-	36	-	
Turn-off delay time	$t_{d(off)}$		-	330	-	
Fall time	$t_f$		-	35	-	
Turn-on energy	$E_{on}$		-	2.0	-	mJ
Turn-off energy	$E_{off}$		-	2.5	-	
Total switching energy	$E_{ts}$		-	4.5	-	

**Anti-Parallel Diode Characteristic**

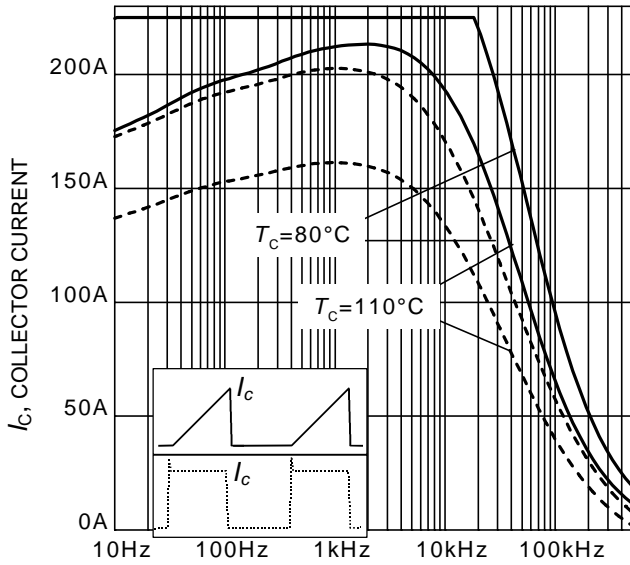
Diode reverse recovery time	$t_{rr}$	$T_j=25^\circ\text{C}$ , $V_R=400\text{V}$ , $I_F=75\text{A}$ , $di_F/dt=1460\text{A}/\mu\text{s}$	-	121	-	ns
Diode reverse recovery charge	$Q_{rr}$		-	2.4	-	$\mu\text{C}$
Diode peak reverse recovery current	$I_{rrm}$		-	38.5	-	A
Diode peak rate of fall of reverse recovery current during $t_b$	$di_{rr}/dt$		-	921	-	$\text{A}/\mu\text{s}$

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

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
<b>IGBT Characteristic</b>						
Turn-on delay time	$t_{d(on)}$	$T_j=175^\circ\text{C}$ , $V_{CC}=400\text{V}$ , $I_C=75\text{A}$ , $V_{GE}=0/15\text{V}$ , $r_G=5\Omega$ , $L_\sigma=100\text{nH}$ , $C_\sigma=39\text{pF}$ $L_\sigma$ , $C_\sigma$ from Fig. E Energy losses include "tail" and diode reverse recovery.	-	32	-	ns
Rise time	$t_r$		-	37	-	
Turn-off delay time	$t_{d(off)}$		-	363	-	
Fall time	$t_f$		-	38	-	
Turn-on energy	$E_{on}$		-	2.9	-	mJ
Turn-off energy	$E_{off}$		-	2.9	-	
Total switching energy	$E_{ts}$		-	5.8	-	

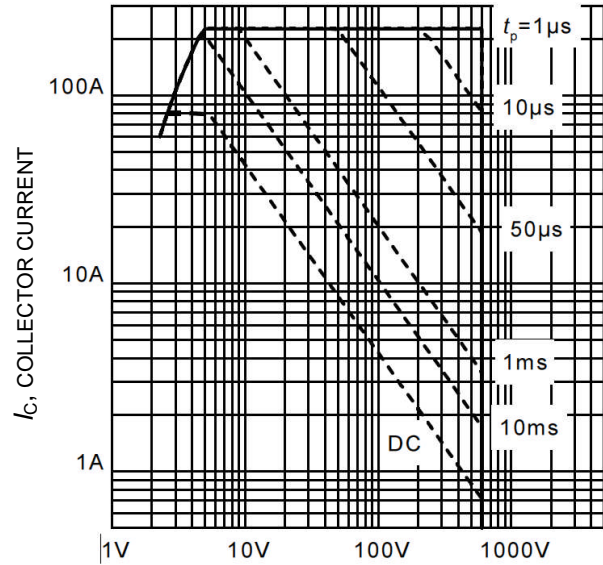
**Anti-Parallel Diode Characteristic**

Diode reverse recovery time	$t_{rr}$	$T_j=175^\circ\text{C}$ $V_R=400\text{V}$ , $I_F=75\text{A}$ , $di_F/dt=1460\text{A}/\mu\text{s}$	-	182	-	ns
Diode reverse recovery charge	$Q_{rr}$		-	5.8	-	$\mu\text{C}$
Diode peak reverse recovery current	$I_{rrm}$		-	56.2	-	A
Diode peak rate of fall of reverse recovery current during $t_b$	$di_{rr}/dt$		-	1013	-	$\text{A}/\mu\text{s}$



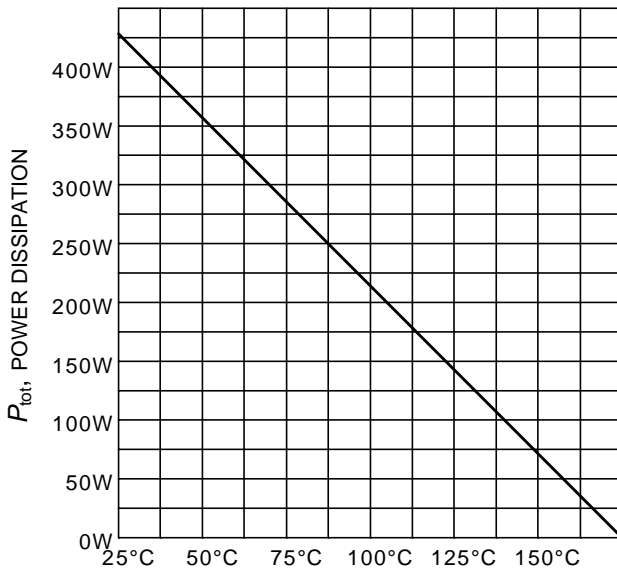
$f$ , SWITCHING FREQUENCY

**Figure 1. Collector current as a function of switching frequency**  
 ( $T_j \leq 175^\circ\text{C}$ ,  $D = 0.5$ ,  $V_{CE} = 400\text{V}$ ,  
 $V_{GE} = 0/15\text{V}$ ,  $r_G = 5\Omega$ )



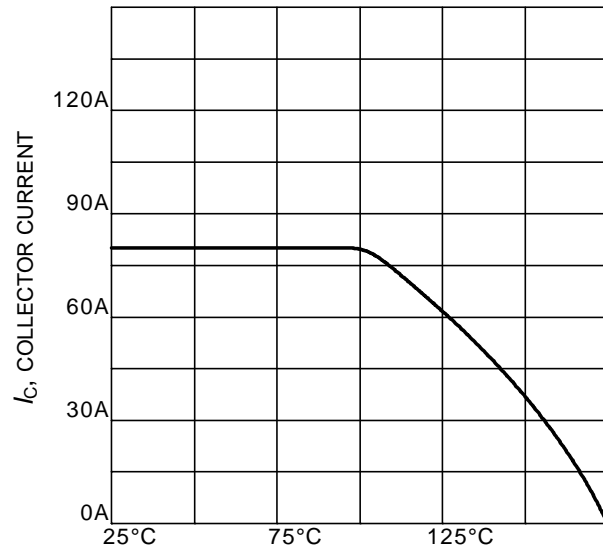
$V_{CE}$ , COLLECTOR-EMITTER VOLTAGE

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



$T_C$ , CASE TEMPERATURE

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



$T_C$ , CASE TEMPERATURE

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