

## Electrical Characteristics of the IGBT

 $T_J = 25^{\circ}\text{C}$  unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
<b>Off Characteristics</b>						
$BV_{CES}$	Collector-Emitter Breakdown Voltage	$V_{GS} = 0\text{V}$ , $I_C = 200\mu\text{A}$	600	—	—	V
$\Delta T_{JA}/\Delta T_{JC}$	Temperature Coefficient of Breakdown Voltage	$V_{GS} = 0\text{V}$ , $I_C = 1\text{mA}$	—	0.6	—	$^{\circ}\text{C}^{-1}$
$I_{CBO}$	Collector Cut-Off Current	$V_{GS} = V_{CES}$ , $V_{CE} = 0\text{V}$	—	—	250	$\mu\text{A}$
$I_{CEO}$	C-E Leakage Current	$V_{GS} = V_{CES}$ , $V_{CE} = 0\text{V}$	—	—	$\pm 100$	nA

## On Characteristics

$V_{GS(th)}$	G-E Threshold Voltage	$I_C = 40\text{mA}$ , $V_{DS} = V_{GS}$	3.5	4.5	6.5	V
$V_{DS(sat)}$	Collector to Emitter Saturation Voltage	$I_C = 40\text{A}$ , $V_{GS} = 15\text{V}$	—	2.1	2.6	V
		$I_C = 80\text{A}$ , $V_{GS} = 15\text{V}$	—	2.6	—	V

## Dynamic Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DS} = 300\text{V}$ , $V_{GS} = 15\text{V}$	—	270	—	ns
$t_{d(off)}$	Turn-Off Delay Time	$V_{DS} = 300\text{V}$ , $V_{GS} = 15\text{V}$	—	280	—	ns
$t_{sw}$	Switching Time	$V_{DS} = 300\text{V}$ , $V_{GS} = 15\text{V}$	—	180	—	ns

## Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DS} = 300\text{V}$ , $I_C = 40\text{A}$ , $R_{\theta JA} = 50^{\circ}\text{C/W}$ , $V_{GS} = 15\text{V}$ , Inductive Load, $T_J = 25^{\circ}\text{C}$	—	30	—	ns
$t_r$	Rise Time		—	50	—	ns
$t_{d(off)}$	Turn-Off Delay Time		—	50	150	ns
$t_f$	Fall Time		—	50	150	ns
$E_{on}$	Turn-On Switching Loss		—	0.70	—	$\mu\text{J}$
$E_{off}$	Turn-Off Switching Loss	$V_{DS} = 300\text{V}$ , $I_C = 40\text{A}$ , $R_{\theta JA} = 50^{\circ}\text{C/W}$ , $V_{GS} = 15\text{V}$ , Inductive Load, $T_J = 25^{\circ}\text{C}$	—	0.90	—	$\mu\text{J}$
$E_{sw}$	Total Switching Loss		—	1.100	1000	$\mu\text{J}$
$t_{d(on)}$	Turn-On Delay Time		—	30	—	ns
$t_r$	Rise Time		—	50	—	ns
$t_{d(off)}$	Turn-Off Delay Time		—	150	200	ns
$t_f$	Fall Time	$V_{DS} = 300\text{V}$ , $I_C = 40\text{A}$ , $R_{\theta JA} = 50^{\circ}\text{C/W}$ , $V_{GS} = 15\text{V}$ , Inductive Load, $T_J = 125^{\circ}\text{C}$	—	150	250	ns
$E_{on}$	Turn-On Switching Loss		—	0.50	—	$\mu\text{J}$
$E_{off}$	Turn-Off Switching Loss		—	0.40	—	$\mu\text{J}$
$E_{sw}$	Total Switching Loss		—	1000	2000	$\mu\text{J}$
$Q_g$	Total Gate Charge		—	170	200	nC
$Q_{ge}$	Gate-Emitter Charge	$V_{DS} = 300\text{V}$ , $I_C = 40\text{A}$ , $V_{GS} = 15\text{V}$	—	20	40	nC
$Q_{gc}$	Gate-Collector Charge		—	90	90	nC
$t_{ce}$	Internal Emitter Inductance	Measured 5mm 50% PWD	—	1.4	—	nH

## Electrical Characteristics of DIODE

 $T_J = 25^{\circ}\text{C}$  unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
$V_{FD}$	Diode Forward Voltage	$I_F = 25\text{A}$	$T_J = 25^{\circ}\text{C}$	—	1.4	1.7	V
			$T_J = 150^{\circ}\text{C}$	—	1.3	—	
$t_{rr}$	Diode Reverse Recovery Time	$I_F = 25\text{A}$ , $dI/dt = 20\text{A}/\mu\text{s}$	$T_J = 25^{\circ}\text{C}$	—	80	90	ns
			$T_J = 100^{\circ}\text{C}$	—	100	—	
$I_{rr}$	Diode Peak Reverse Recovery Current		$T_J = 25^{\circ}\text{C}$	—	4.5	10	A
			$T_J = 100^{\circ}\text{C}$	—	8.0	—	
$Q_{rr}$	Diode Reverse Recovery Charge		$T_J = 25^{\circ}\text{C}$	—	110	205	nC
			$T_J = 100^{\circ}\text{C}$	—	400	—	

# G80n60ufd Service Manual

**S. Prentiss**



## **G80n60ufd Service Manual:**

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