

## 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	$I_C = 40\text{mA}$ , $V_{CE} = V_{GS}$	3.5	4.5	6.5	V
$V_{CE(sat)}$	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	$V_{GS} = 15\text{V}$ , $V_{CE} = 0\text{V}$	—	270	—	ns
$t_{d(off)}$	Turn-Off Delay Time	$V_{GS} = 15\text{V}$ , $V_{CE} = 0\text{V}$	—	280	—	ns
$t_{sw}$	Switching Time	$V_{GS} = 15\text{V}$ , $V_{CE} = 0\text{V}$	—	180	—	ns

## Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{GS} = 15\text{V}$ , $V_{CE} = 0\text{V}$ , $R_{\theta JA} = 50^{\circ}\text{C/W}$ , $V_{GS} = 15\text{V}$ , 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	$V_{GS} = 15\text{V}$ , $V_{CE} = 0\text{V}$ , $R_{\theta JA} = 50^{\circ}\text{C/W}$ , $V_{GS} = 15\text{V}$ , 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	$V_{GS} = 15\text{V}$ , $V_{CE} = 0\text{V}$ , $R_{\theta JA} = 50^{\circ}\text{C/W}$ , $V_{GS} = 15\text{V}$ , 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	$\mu\text{J}$
$Q_g$	Gate Charge		—	170	200	nC
$Q_{ge}$	Gate-Emitter Charge	$V_{GS} = 15\text{V}$ , $I_C = 40\text{A}$ , $V_{GS} = 15\text{V}$	—	20	40	nC
$Q_{gc}$	Gate-Collector Charge		—	90	90	nC
$t_{ce}$	Internal Emitter Inductance	Measured 5mm 50% PKD	—	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

**Robert L. Goodman**



## **G80n60ufd Service Manual:**

**Gas Appliance Service Manual** Joint A.G.A.-GAMA Committee on Gas Appliance Service Manuals,1960      **1961 F85 Oldsmobile Service Manual** General Motors Corporation. Oldsmobile Division. Service Department,1960      **Oldsmobile Service Manual, 1959** General Motors Corporation. Oldsmobile Division. Service Department,1958      *General Motors J-Cars Automotive Repair Manual* Larry Warren,John Harold Haynes,1990      *American Service Manual* Champion Electric Corporation,1946      Oldsmobile Service Manual ,      **Jenn-air Electric Cooktops Service Manual** ,1997      **Service Manual** ,1981      *The TAB Service Manual for CCTV and MATV* Robert L. Goodman,1990-05-01      General Electric Color Tv Service Manual S. Prentiss,1975      1961 Oldsmobile F-85 Service Manual (Revised) GM Corporation,2020-05-28 This 1961 Oldsmobile F 85 Service Manual Revised is a high quality licensed PRINT reproduction of the service manual authored by General Motors Corporation and published by Detroit Iron This OEM factory manual is 8 5 x 11 inches paperback bound shrink wrapped and contains 486 pages of comprehensive mechanical instructions with detailed diagrams photos and specifications for the mechanical components of your vehicle such as the engine transmission suspension brakes fuel exhaust steering electrical and drive line Service repair manuals were originally written by the automotive manufacturer to be used by their dealership mechanics The following 1961 Oldsmobile models are covered F85 This factory written Detroit Iron shop manual is perfect for the restorer or anyone working on one of these vehicles      Service Manual ,2022      Briggs and Stratton Service and Repair Manual ,1977      *General Electric Color TV Service Manual* Robert L. Goodman,1970      *Service Manual, Series 50 Thru 65* General Motors Corporation. GMC Truck & Coach Division,19??      **Series 92 Service Manual** Detroit Diesel Corporation,1988      Appliance Service Manual Admiral (Bloomington, Ill.),1979      Firebird Service Manual General Motors Corporation,1967      **General Electric Color TV Service Manual Volume Two** Stan Prentiss,1972      **Gas** ,1983

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