

600V, 7A, Trench FS II Fast IGBT

General Description:

Using MJ's proprietary trench design and advanced FS (Field Stop) second generation technology, the 600V Trench FSII IGBT offers superior conduction and switching performances, and easy parallel operation;

Features

- Trench FSII Technology offering
- Very low VCE (sat)
- High speed switching
- Positive temperature coefficient in Vce (sat)
 Very tight parameter distribution
- Very tight parameter distribution
 High ruggedness, temperature stable behavior



Schematic diagram

Application

- ♦ Air Condition
- Inverters
- Motor drives



TO-263

Package Marking and Ordering Information

Device	Device Package	Device Marking			
MJ07TD60BD	TO-263	MJ07TD60BD			

Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

Parameter	Symbol	Value	Units	
Collector-Emitter Voltage	Vces	600	V	
Gate- Emitter Voltage	Vges	±30	V	
Collector Current	lc	14	А	
Collector Current @Tc = 100 °C	lc	7	А	
Pulsed Collector Current, t_p limited by T_{jmax}	Cplus	21	А	
turn off safe operating area, V_{CE} =600V, Tj=150°C	-	21	А	
Diode Continuous Forward Current @Tc = 100 °C	lF	7	А	
Diode Maximum Forward Current	lfм	21	А	
Power Dissipation @ Tc = 25°C	PD	87	W	
Power Dissipation @Tc = 100 °C	PD	43.5	W	
Operating Junction and Storage Temperature Range	TJ,Tstg	-55 to +175	°C	
Maximum Temperature for Soldering	T∟	260	°C	
Short circuit withstand time V _{GE} =15.0V, V _{CC} ≤400V, Allowed number of short circuits<1000Time between short circuits:≥1.0s,Tj≤150°C	tsc	5	us	





Thermal Characteristic

Parameter	Symbol	Value	Units
Thermal Resistance, Junction to case for IGBT	Rejc	1.71	°C/W
Thermal Resistance, Junction to case for Diode	Rejc	2.50	°C/W
Thermal Resistance, Junction to Ambient	Reja	62	°C/W

Electrical Characteristics (Tc=25°C unless otherwise noted)

Deservation	Symbol	Test Conditions		Value			Unite	
Parameter	Symbol			Min	Тур	Max	Units	
Static Characteristics								
Collector-Emitter Breakdown Voltage	V(BR)CES	V _{GE} =0V,	Ice=1mA	600	-	-	V	
Collector-Emitter Leakage Current	Ices	V _{GE} =0V,V	/ce=600V	-	-	4	uA	
Gate to Emitter Forward Leakage	IGES(F)	V _{GE} =+30	V,Vce=0V	-	-	100	nA	
Gate to Source Reverse Leakage	IGES(R)	VGE=-30	V,Vce=0V	-	-	100	nA	
Online ten Envitten Ontwertien Methans	Tj=25°C	Tj=25°C	-	1.7	1.9	V		
Collector-Emitter Saturation voltage	VCE(sat)	V _{GE} =15V	Tj=100°C	-	1.9	-	V	
Gate Threshold Voltage	V _{GE(th)}	Ic=1mA	Vce=Vge	4.0	5.0	6.0	V	
Dynamic Characteristics	1	1			1		1	
Input Capacitance	Cies			-	675	-	pF	
Output Capacitance	Coss	Vce=25V,Vge=0V, f=1MHz		-	22	-	pF	
Reverse Transfer Capacitance	Crss			-	13	-	pF	
Total Gate Charge	Qg	V _{cc} =480V, Ic=7A V _{GE} =15V		-	28	-	nC	
Gate to Emitter Charge	Qge			-	8	-	nC	
Gate to Collector Charge	Qgc			-	13	-	nC	
Short circuit collector current Max.1000 short circuits Time between short circuits: ≥1.0s	Ic(sc)	V _{GE} =15V,Vcc≤400V, tsc≤5us,Tj≤150°C		-	34	-	А	
Switching Characteristics								
Turn-on Delay Time	td(ON)			-	20	-	ns	
Rise Time	tr	Vcc=400V,Ic=7A Vcε=0/15V, Rg=5Ω Inductive Load		-	15	-	ns	
Turn-Off Delay Time	td(OFF)			-	73	-	ns	
Fall Time	tr			-	18	-	ns	
Turn-On Switching Loss	Eon			-	0.21	-	mJ	
Turn-Off Switching Loss	Eoff			-	0.10	-	mJ	
Total Switching Loss	Ets	-		-	0.31	-	mJ	





Electrical Characteristics of the Diode (Tc= 25°C unless otherwise specified):

Decemeter	Symbol	Test Conditions	Rating			Linita
Parameter	Symbol	Test Conditions	Min	Тур	Max	Units
Diode Forward Voltage	Vfm	I⊧=7A	-	1.5	1.9	V
Reverse Recovery Time	Trr		-	230	-	ns
Diode Peak Reverse Recovery Current	IRRM	l⊧=7A,di/dt=200A/uS	-	3.5	-	А
Reverse Recovery Charge	Qrr		-	0.44	-	uC
Pulse width ttp≤380μs,δ≤2%					*	

Test Circuit



Gate Charge Test Circuit

Switching characteristics



definition of switching times



Definition of diode switching characteristics



Switch Time Test Circuit



definition of switching losses





Ic, Collector Current (A)

Typical Electrical and Thermal Characteristics

RoHS



VCE, Collector-Emitter Voltage (V) Figure 1 Output Characteristics











VGE, Gate-Emitter Voltage (V) Figure 2 Transfer Characteristics



VGE, Gate-Emitter Voltage (V) Figure 4 Saturation Voltage vs. VGE



QG, Total Gate Charge (nC) Figure 6 Gate charge waveform

VGE, Gate-Emitter Voltage (V)

VcE, Collector-Emitter Saturation





Typical Electrical and Thermal Characteristics



VF, Forward Voltage (V) Figure 7 Forward Characteristics











TJ, Junction Temperature (°C) Figure 8 VF vs. Temperature



TJ, Junction Temperature (°C) Figure 10 Typical Switching Times as a Function of Junction Temperature



Ic, Collector Current (A) Figure 12 Typical Collector-emitter Saturation Voltage as a function of Collector Current





Typical Electrical and Thermal Characteristics



VCE, Collector-Emitter Voltage (V)

Figure 13 Forward Bias Safe Operating Area





TO-263-3L Package Information







Symbol	Dimensions	In Millimeters	Dimensions In Inches		
	Min.	Max.	Min.	Max.	
A	4.40	4.60	0.17	0.18	
A1	0.00	0.25	0.00	0.01	
A2	2.20	2.60	0.09	0.10	
b	0.76	0.89	0.03	0.04	
b2	1.23	1.37	0.04	0.05	
С	0.47	0.60	0.01	0.02	
c1	0.46	0.56	0.18	0.02	
c2	1.25	1.35	0.05	0.05	
D	9.10	9.30	0.35	0.36	
D1	8.00	-	0.31	8	
E	9.80	10.00	0.38	0.39	
E1	7.80	-	0.31	<u>ت</u>	
e	2.54	4BSC	0.10	BSC	
н	14.90	15.70	0.59	0.62	
L	2.00	2.60	0.08	0.10	
L1	1.17	1.40	0.05	0.06	
L2	3 - 2	1.75	-	0.07	
L4	4.6	OREF	0.18REF		





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