

Designer's™ Data Sheet

NPN Silicon Power Transistors

SWITCHMODE Bridge Series

... specifically designed for use in half bridge and full bridge off line converters.

- Excellent Dynamic Saturation Characteristics
- Rugged RBSOA Capability
- Collector-Emitter Sustaining Voltage — $V_{CEO(sus)}$ — 400 V
- Collector-Emitter Breakdown — $V_{(BR)CES}$ — 650 V
- State-of-Art Bipolar Power Transistor Design
- Fast Inductive Switching:
 - $t_{fi} = 25$ ns (Typ) @ 100°C
 - $t_c = 50$ ns (Typ) @ 100°C
 - $t_{sv} = 1$ μ s (Typ) @ 100°C
- Ultrafast FBSOA Specified
- 100°C Performance Specified for:
 - RBSOA
 - Inductive Load Switching
 - Saturation Voltages
 - Leakages

MAXIMUM RATINGS

Rating	Symbol	MJ16110	MJW16110	Unit
Collector-Emitter Sustaining Voltage	$V_{CEO(sus)}$	400		Vdc
Collector-Emitter Breakdown Voltage	V_{CES}	650		Vdc
Emitter-Base Voltage	V_{EBO}	6		Vdc
Collector Current — Continuous	I_C	15		Adc
— Pulsed (1)	I_{CM}	20		
Base Current — Continuous	I_B	10		Adc
— Pulsed (1)	I_{BM}	15		
Total Power Dissipation	P_D			Watts
@ $T_C = 25^\circ\text{C}$		175	135	
@ $T_C = 100^\circ\text{C}$		100	54	
Derated above 25°C		1	1.09	W/°C
Operating and Storage Temperature	T_J, T_{stg}	-65 to 200	-55 to 150	°C

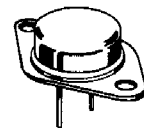
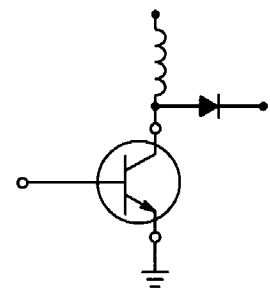
THERMAL CHARACTERISTICS

Thermal Resistance — Junction to Case	$R_{\theta JC}$	1	0.92	°C/W
Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 5 Seconds	T_L	275		°C

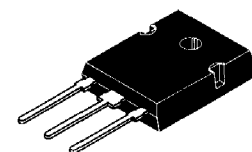
(1) Pulse Test: Pulse Width = 5 ms, Duty Cycle \leq 10%.

MJ16110*
MJW16110*

POWER TRANSISTORS
15 AMPERES
400 VOLTS
175 AND 135 WATTS



(FORMERLY TO-3)
MJ16110



TO-247AE
MJW16110



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Quality Semi-Conductors

MJ16110 MJW16110

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS (1)					
Collector-Emitter Sustaining Voltage (Table 1) ($I_C = 20\text{ mAdc}$, $I_B = 0$)	$V_{CEO(sus)}$	400	—	—	Vdc
Collector Cutoff Current ($V_{CE} = 650\text{ Vdc}$, $V_{BE(off)} = 1.5\text{ V}$) ($V_{CE} = 650\text{ Vdc}$, $V_{BE(off)} = 1.5\text{ V}$, $T_C = 100^\circ\text{C}$)	I_{CEV}	— —	— —	100 1000	μAdc
Collector Cutoff Current ($V_{CE} = 650\text{ Vdc}$, $R_{BE} = 50\ \Omega$, $T_C = 100^\circ\text{C}$)	I_{CER}	—	—	1000	μAdc
Emitter-Base Leakage ($V_{EB} = 6\text{ Vdc}$, $I_C = 0$)	I_{EBO}	—	—	10	μAdc

ON CHARACTERISTICS (1)

Collector-Emitter Saturation Voltage ($I_C = 5\text{ Adc}$, $I_B = 0.5\text{ Adc}$) ($I_C = 10\text{ Adc}$, $I_B = 1.2\text{ Adc}$) ($I_C = 10\text{ Adc}$, $I_B = 2\text{ Adc}$) ($I_C = 10\text{ Adc}$, $I_B = 2\text{ Adc}$, $T_C = 100^\circ\text{C}$)	$V_{CE(sat)}$	— — — —	0.3 0.7 0.3 0.4	0.9 2.0 1.0 1.5	Vdc
Base-Emitter Saturation Voltage ($I_C = 10\text{ Adc}$, $I_B = 2\text{ Adc}$) ($I_C = 10\text{ Adc}$, $I_B = 2\text{ Adc}$, $T_C = 100^\circ\text{C}$)	$V_{BE(sat)}$	— —	1.2 1.2	1.5 1.5	Vdc
DC Current Gain ($I_C = 15\text{ Adc}$, $V_{CE} = 5\text{ Vdc}$)	h_{FE}	6	12	20	—

DYNAMIC CHARACTERISTICS

Dynamic Saturation	$V_{CE(dsat)}$	See Figures 11, 12, and 13			V
Output Capacitance ($V_{CE} = 10\text{ Vdc}$, $I_E = 0$, $f_{test} = 1\text{ kHz}$)	C_{ob}	—	—	400	pF

SWITCHING CHARACTERISTICS

Inductive Load (Table 1)							
Storage	$I_C = 10\text{ A}$, $I_{B1} = 1\text{ A}$, $V_{BE(off)} = 5\text{ V}$, $V_{CE(pk)} = 250\text{ V}$	$T_J = 25^\circ\text{C}$	t_{sv}	—	700	1500	ns
Crossover			t_c	—	45	150	
Fall Time			t_{fi}	—	20	75	
Storage		$T_J = 100^\circ\text{C}$	t_{sv}	—	1000	2000	
Crossover			t_c	—	50	200	
Fall Time			t_{fi}	—	25	125	
Resistive Load (Table 2)							
Delay Time	$I_C = 10\text{ A}$, $I_{B1} = 1\text{ A}$, $V_{CC} = 250\text{ V}$, $PW = 30\ \mu\text{s}$, Duty Cycle = $\leq 2\%$	$I_{B2} = 2\text{ A}$, $R_{B2} = 4\ \Omega$	t_d	—	15	—	ns
Rise Time			t_r	—	330	—	
Storage Time			t_s	—	800	—	
Fall Time		$V_{BE(off)} = 5\text{ V}$	t_f	—	110	—	
Storage Time			t_s	—	500	—	
Fall Time			t_f	—	250	—	

(1) Pulse Test: Pulse Width = $300\ \mu\text{s}$, Duty Cycle $\leq 2\%$.