40V PNP MEDIUM POWER TRANSISTOR IN SOT23

Features

- BV_{CEO} > -40V
- I_C = -1A High Continuous Current
- I_{CM} = -2A Peak Pulse Current
- Low Saturation Voltage $V_{CE(sat)}$ < -500mV @ -1A
- R_{sat} = 350mΩ for a Low Equivalent On-Resistance
- Complementary NPN Type: FMMT491AQ
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The FMMT591AQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF16949 certified facilities.**
  https://www.diodes.com/quality/product-definitions/

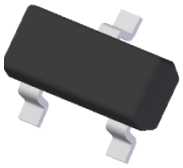
Mechanical Data

- Package: SOT23
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.008 grams (Approximate)

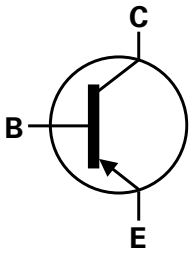
Application

- Power MOSFET gate driving
- Low loss power switching

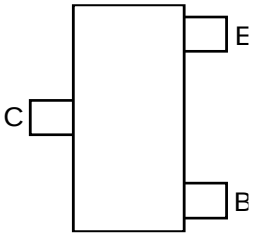
SOT23 (Type DN)



Top View



Device Symbol



Top View
Pin-Out

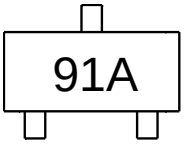
Ordering Information (Note 4)

Orderable Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
FMMT591AQTA	SOT23 (Type DN)	91A	7	8	3,000	Reel
FMMT591AQTC	SOT23 (Type DN)	91A	7	8	10,000	Reel

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information

SOT23 (Type DN)



91A = Product Type Marking Code

Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	-40	V
Collector-Emitter Voltage	V_{CEO}	-40	V
Emitter-Base Voltage	V_{EBO}	-7	V
Continuous Collector Current	I_C	-1	A
Peak Pulse Current	I_{CM}	-2	A
Base Current	I_B	-200	mA
Peak Base Current	I_{BM}	-1	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	500	mW
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	250	°C/W
Thermal Resistance, Junction to Case	(Note 5)	$R_{\theta JC}$	66	°C/W
Thermal Resistance, Junction to Lead	(Note 6)	$R_{\theta JL}$	197	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 7)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

Notes:
5. For a device mounted with the collector lead on 15mm × 15mm 1oz copper that is on a single-sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in a steady state.
6. Thermal resistance from junction to solder-point (at the end of the collector lead).
7. Refer to JEDEC specifications JESD22-A114 and JESD22-A115.

Thermal Characteristics and Derating Information

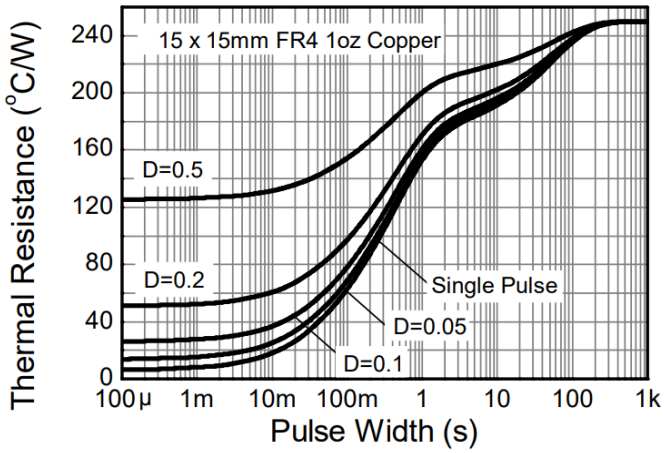


Fig.1 Transient Thermal Impedance

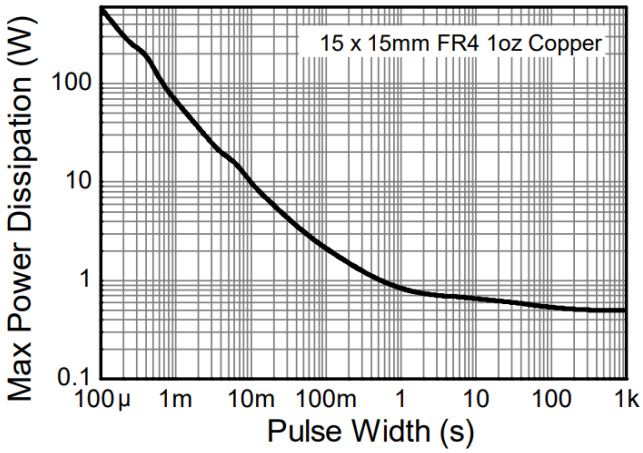


Fig.2 Pulse Power Dissipation

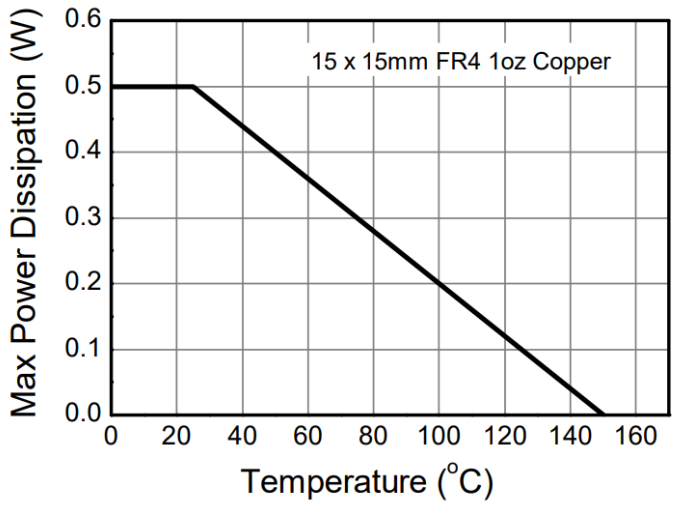


Fig.3 Derating Curve

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage		BV_{CBO}	-40	—	—	V	I_C = -100µA
Collector-Emitter Breakdown Voltage (Note 8)		BV_{CEO}	-40	—	—	V	I_C = -10mA
Emitter-Base Breakdown Voltage		BV_{EBO}	-7	—	—	V	I_E = -100µA
Collector Cutoff Current		I_{CBO}	—	—	-100	nA	V_{CB} = -30V
Collector-Emitter Cutoff Current		I_{CES}	—	—	-100	nA	V_{CES} = -30V
Emitter Cutoff Current		I_{EBO}	—	—	-100	nA	V_{EB} = -5.6V
Collector-Emitter Saturation Voltage (Note 8)		$V_{CE(sat)}$	—	—	-200 -350 -500	mV	I_C = -100mA, I_B = -1mA I_C = -500mA, I_B = -20mA I_C = -1A, I_B = -100mA
Base-Emitter Saturation Voltage (Note 8)		$V_{BE(sat)}$	—	—	-1.1	V	I_C = -1A, I_B = -100mA
Base-Emitter Turn-On Voltage (Note 8)		$V_{BE(on)}$	—	—	-1.0	V	I_C = -1A, V_{CE} = -5V
Static Forward Current Transfer Ratio (Note 8)		h_{FE}	300 300 250 160 30	—	— 800 — — —	—	I_C = -1mA, V_{CE} = -5V I_C = -100mA, V_{CE} = -5V I_C = -500mA, V_{CE} = -5V I_C = -1A, V_{CE} = -5V I_C = -2A, V_{CE} = -5V
Transition Frequency		f_t	150	—	—	MHz	V_{CE} = -10V, I_C = -50mA, f = 100MHz
Output Capacitance		C_{obo}	—	—	10	pF	V_{CB} = -10V, f = 1MHz
Switching Time	Delay Time	t_d	—	34.9	—	ns	V_{CC} = -10V, I_C = -500mA, I_{B1} = -I_{B2} = -25mA
	Rise Time	t_r	—	19.2	—		
	Storage Time	t_s	—	249	—		
	Fall Time	t_f	—	62	—		

Note: 8. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

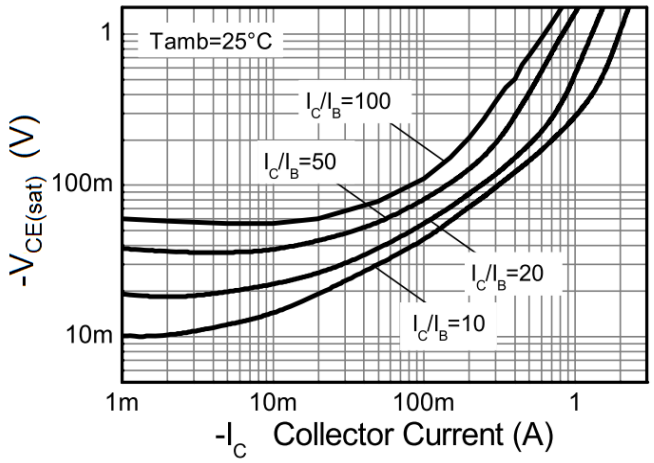


Fig.4 $V_{CE(sat)}$ v I_C

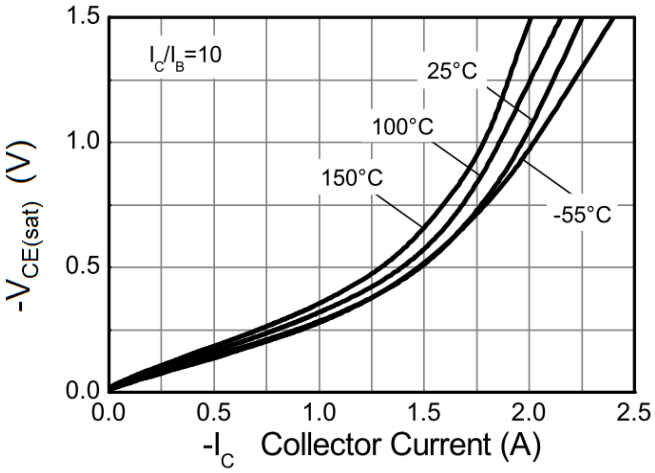


Fig.5 $V_{CE(sat)}$ v I_C

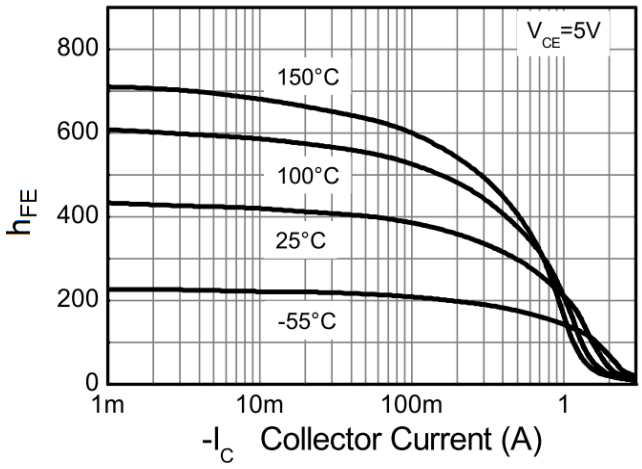


Fig.6 h_{FE} v I_C

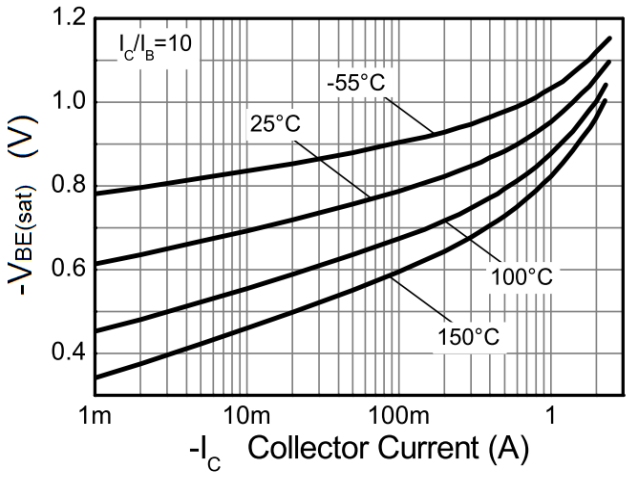


Fig.7 $V_{BE(sat)}$ v I_C

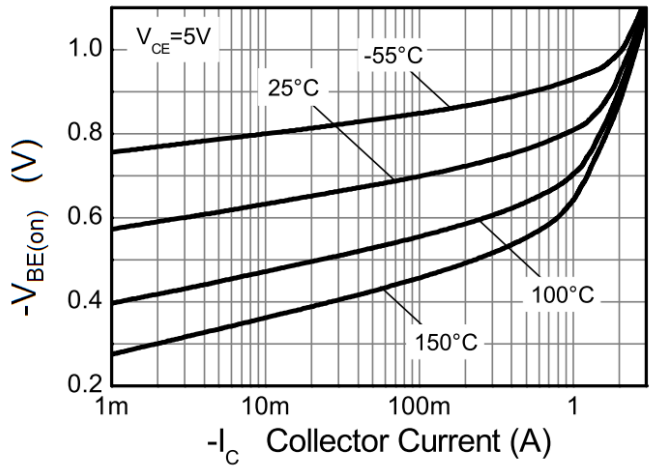
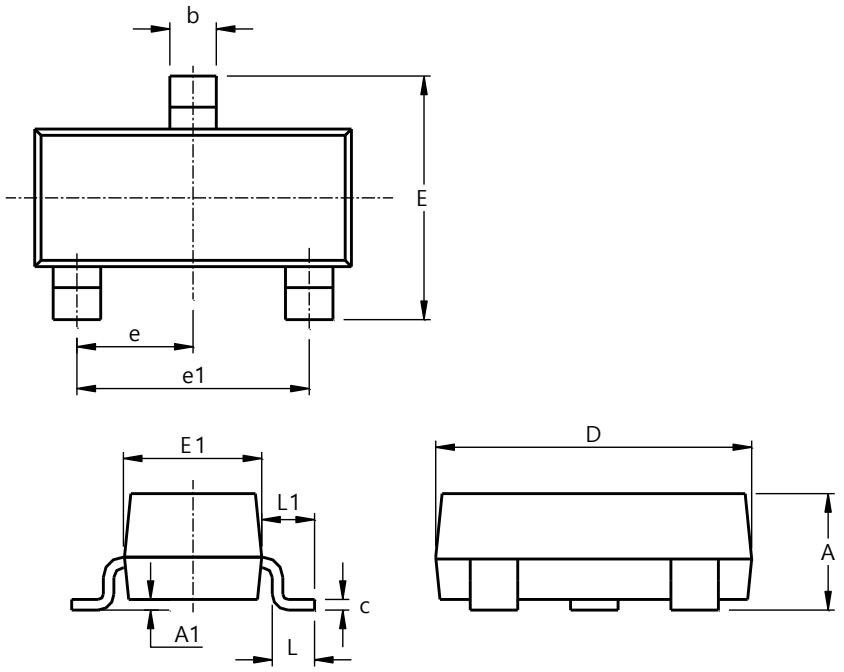


Fig.8 $V_{BE(on)}$ v I_C

Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

SOT23 (Type DN)

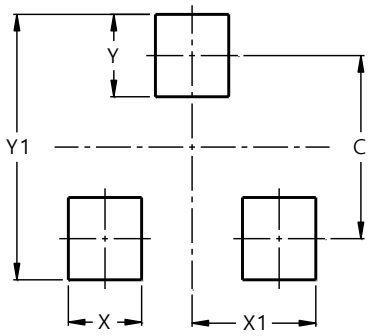


SOT23 Type DN			
Dim	**Min**	**Max**	**Typ**
A	0.89	1.12	1.00
A1	0.01	0.10	0.05
b	0.30	0.51	0.45
c	0.08	0.20	0.10
D	2.80	3.04	3.00
E	2.10	2.64	2.42
E1	1.20	1.40	1.37
e	0.95 REF		
e1	1.90 REF		
L	0.25	0.60	0.30
L1	0.45	0.62	0.54
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

SOT23 (Type DN)



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

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