

# RBT020N120A1BP7

1200V - 93A - Silicon Carbide N-channel MOSFET

Application: Automotive and industrial

Rev.0.04  
Oct.15.2024

## Description

The RBT020N120A1BP7 is a Silicon Carbide Power MOSFET designed for high voltage high current switching applications.

## Features

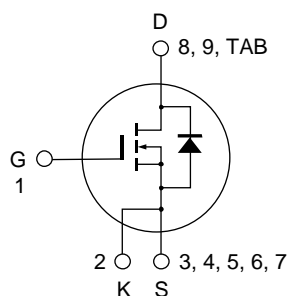
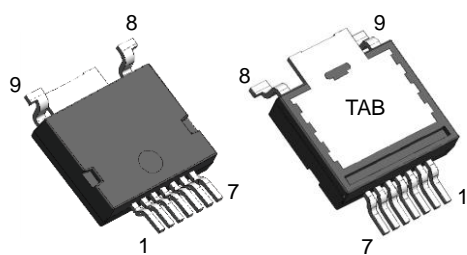
- Low on-state resistance  
 $R_{DS(on)} = 20 \text{ m}\Omega$  TYP. (  $V_{GS} = 15 \text{ V}$  )
- Low input capacitance  
 $C_{iss} = 5180 \text{ pF}$  TYP. (  $V_{DS} = 800 \text{ V}$  )
- Available in R2PAK

## Ordering Information

Part No.	Quantity	Shipping container
RBT020N120A1BP7	TBD	TBD

## Outline

Package name: R2PAK



1. Gate
2. Kelvin
- 3, 4, 5, 6, 7. Source
- 8, 9, TAB. Drain

## Absolute Maximum Ratings

(T<sub>A</sub> = 25 °C)

Item	Symbol	Ratings	Unit
Drain to Source Voltage (V <sub>GS</sub> = 0 V)	V <sub>DSS</sub>	1200	V
Gate to Source Voltage (V <sub>DS</sub> = 0 V)	V <sub>GSS</sub>	-8/+18	V
Recommended Operating Gate Voltage	V <sub>GSS_op</sub>	-5/+15	V
Drain Current (DC)	T <sub>C</sub> = 25 °C	I <sub>D(DC)1</sub>	A
	T <sub>C</sub> = 100 °C	I <sub>D(DC)2</sub>	A
Drain Current (pulse) <sup>Note1</sup>	I <sub>D(pulse)</sub>	200	A
Total Power Dissipation <sup>Note1</sup>	P <sub>T</sub>	385	W
Junction Temperature	T <sub>j</sub>	-55 to 175	°C
Storage Temperature	T <sub>stg</sub>	-55 to 175	°C

Note: 1. The power dissipation P<sub>T</sub> is based on T<sub>j</sub>(MAX) = 175 °C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

## Thermal Resistance

(T<sub>A</sub> = 25 °C)

Item	Symbol	Max. Value <sup>Note2</sup>	Unit
Junction to Case Thermal Resistance	R <sub>th(j-c)</sub>	0.39	°C/W
Junction to Ambient Thermal Resistance	R <sub>th(j-a)</sub>	50	°C/W

Note: 2. Designed target value on Renesas measurement condition. (Not tested)

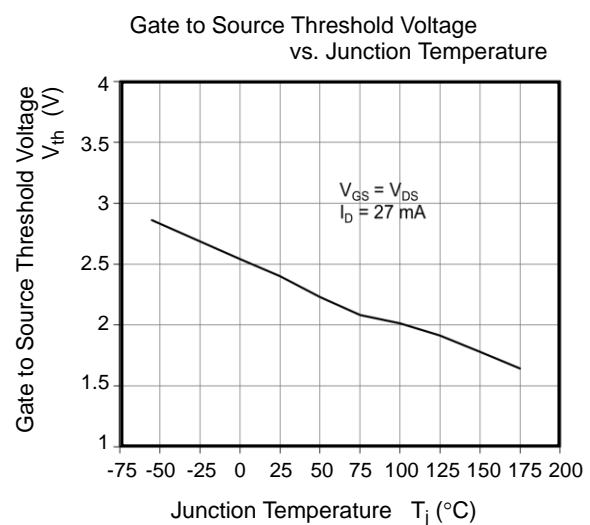
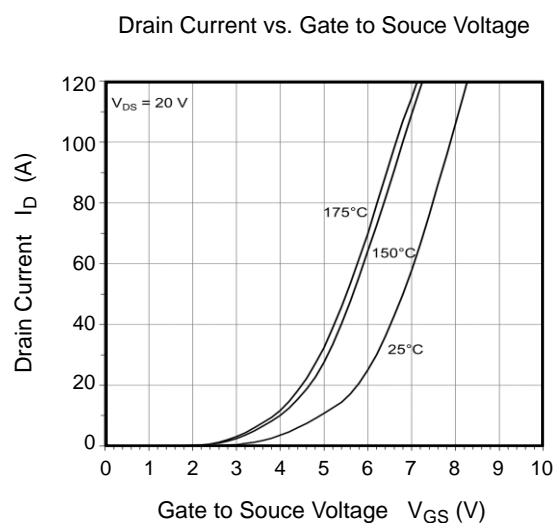
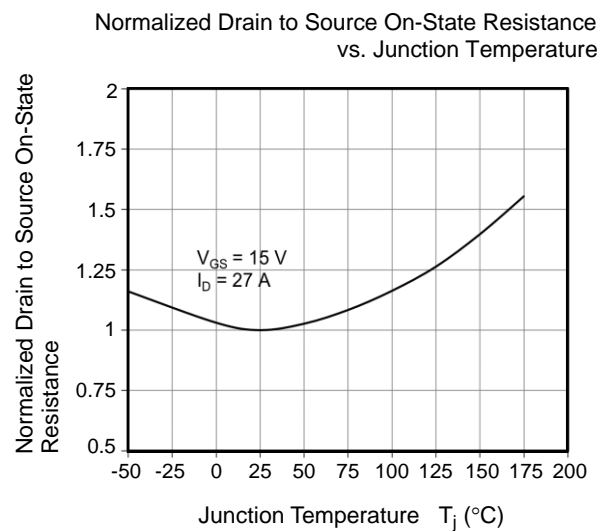
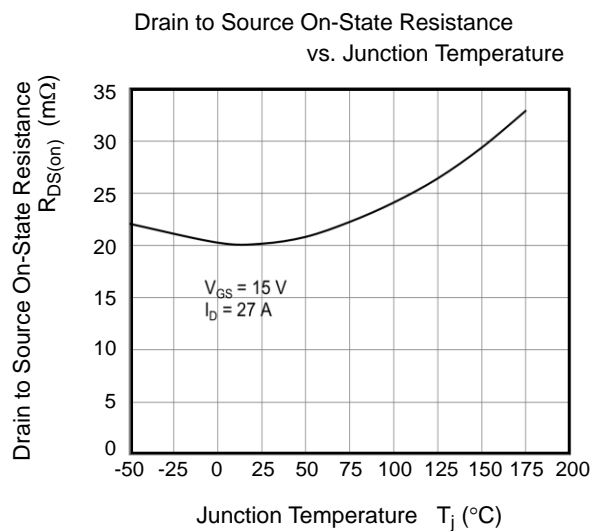
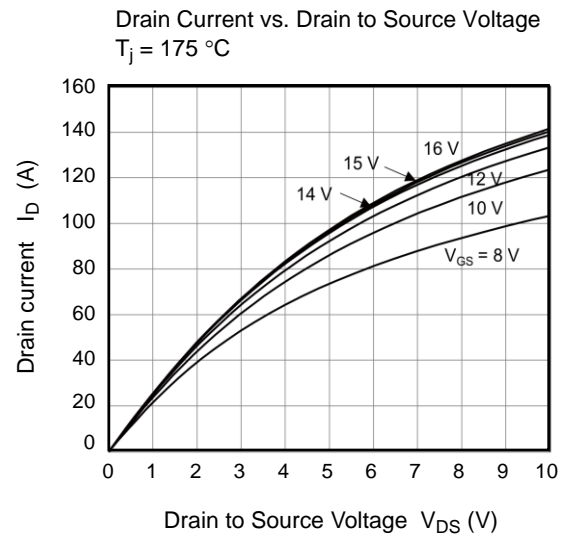
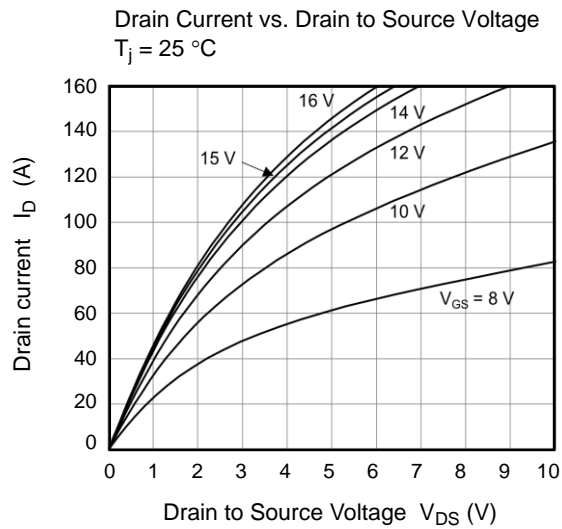
## Electrical Characteristics

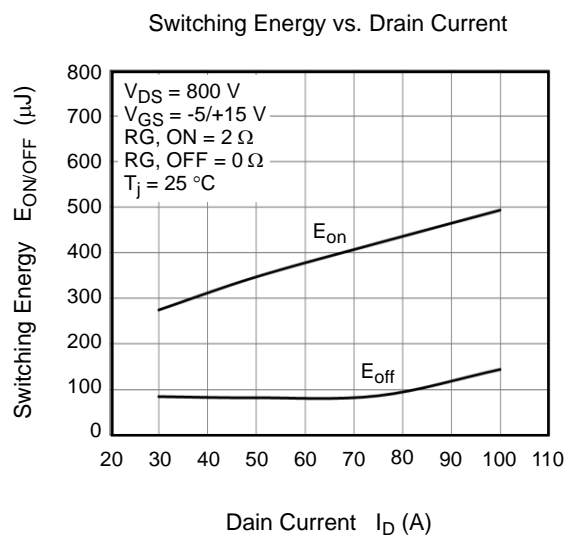
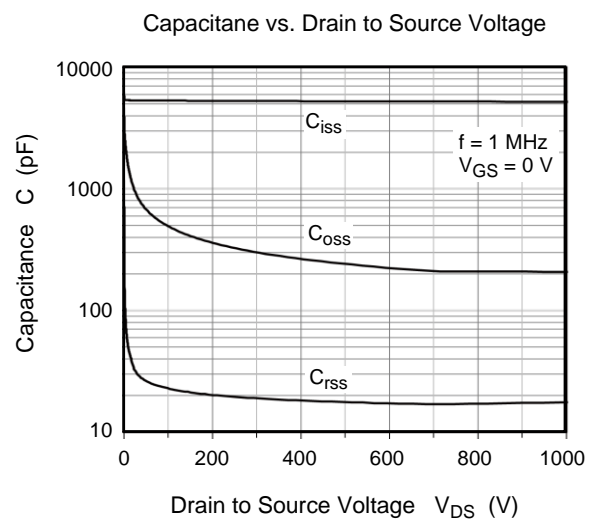
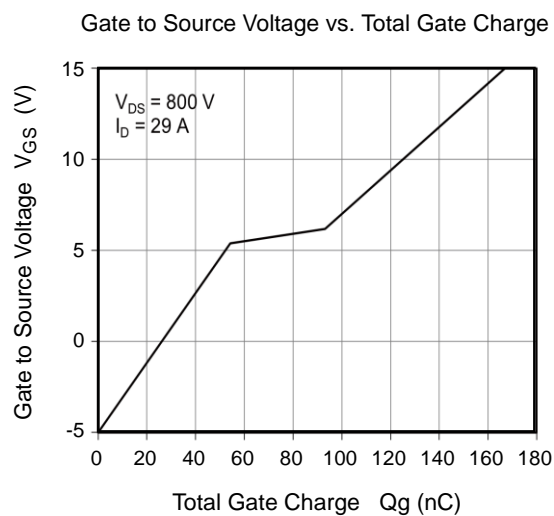
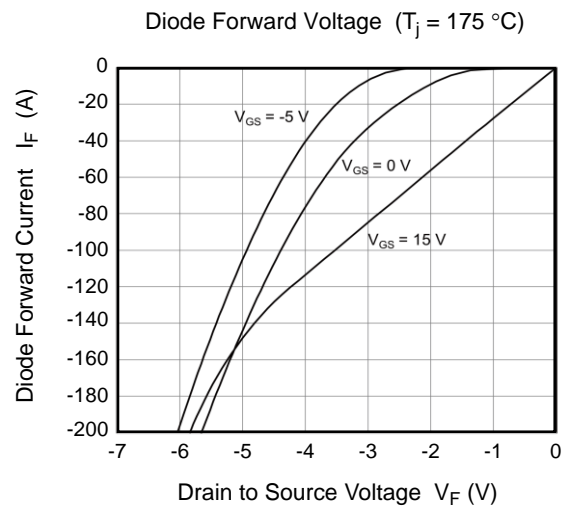
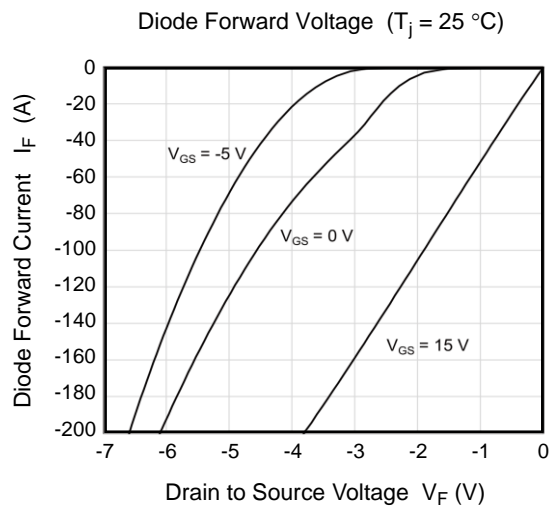
(T<sub>A</sub> = 25 °C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to Source Breakdown Voltage	V <sub>(BR)DSS</sub>	1200	—	—	V	I <sub>DS</sub> = 250 μA, V <sub>GS</sub> = 0 V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	100	μA	V <sub>DS</sub> = 1200 V, V <sub>GS</sub> = 0 V
Gate Leakage Current	I <sub>GSS</sub>	—	—	±200	nA	V <sub>GS</sub> = -5/+15V, V <sub>DS</sub> = 0 V
Gate to Source Threshold Voltage	V <sub>GS(th)</sub>	1.8	2.4	3.5	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 27 mA
Drain to Source On-state Resistance	R <sub>DS(on)</sub> <sup>Note3</sup>	—	20	28	mΩ	V <sub>GS</sub> = 15 V, I <sub>D</sub> = 27 A
Input Capacitance	C <sub>iss</sub>	—	5180	—	pF	V <sub>DS</sub> = 800 V
Output Capacitance	C <sub>oss</sub>	—	208	—	pF	V <sub>GS</sub> = 0 V
Reverse Transfer Capacitance	C <sub>rss</sub>	—	18	—	pF	f = 1 MHz
Internal Gate Resistance	R <sub>G,int</sub>	—	1	—	Ω	f = 1 MHz
Turn-on Delay Time	t <sub>d(on)</sub>	—	15	—	ns	V <sub>DD</sub> = 800 V, I <sub>D</sub> = 30 A
Rise Time	t <sub>r</sub>	—	13	—	ns	V <sub>GS</sub> = -5/+15V
Turn-off Delay Time	t <sub>d(off)</sub>	—	21	—	ns	R <sub>G ON / OFF</sub> = 2 / 0 Ω
Fall Time	t <sub>f</sub>	—	13	—	ns	
Turn-on Energy	E <sub>on</sub>	—	278	—	μJ	
Turn-off Energy	E <sub>off</sub>	—	81	—	μJ	
Total Gate Charge	Q <sub>G</sub>	—	166	—	nC	V <sub>DD</sub> = 800 V, I <sub>D</sub> = 30 A
Gate to Source Charge	Q <sub>GS</sub>	—	55	—	nC	V <sub>GS</sub> = -5/+15V
Gate to Drain Charge	Q <sub>GD</sub>	—	32	—	nC	
Body Diode Forward Voltage	V <sub>F(S-D)</sub> <sup>Note3</sup>	—	4.3	5	V	I <sub>F</sub> = 27 A, V <sub>GS</sub> = -5 V
Reverse Recovery Time	t <sub>rr</sub>	—	17	—	ns	I <sub>F</sub> = 30 A, V <sub>GS</sub> = -5 V
Reverse Recovery Charge	Q <sub>rr</sub>	—	225	—	nC	di/dt = 1500 A/μs

Note: 3. Pulse test

## Typical Characteristics







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