RECTRON SEMICONDUCTOR
TECHNICAL SPECIFICATION

RM7N40S4

N-CHANNEL ENHANCEMENT MODE MOSFET

Description

This new generation MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Features

- Low On-Resistance
- Fast Switching Speed
- Low Threshold
- Low Gate Drive

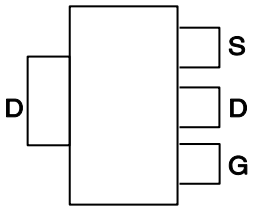
Applications

- DC-DC Converters
- Audio Output Stages
- Relay and Solenoid Driving
- Motor Control

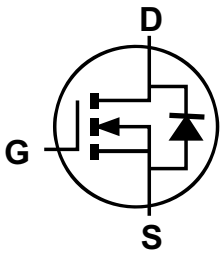
Mechanical Data

- Case: SOT223
- Case Material: Molded Plastic, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208

SOT223



Pin Out - Top View



Equivalent Circuit

Top View

Product Summary

BV_{DSS}	$R_{DS(ON)}$	I_D T_A = +25°C
40V	0.05Ω @ V_{GS} = 10V	7A

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	40	V
Gate-Source Voltage			V_{GS}	±20	V
Continuous Drain Current	V_{GS} = 10V	T_A = +70°C (Note 2)	I_D	7	A
				5.6	
		(Note 1)		5	
Pulsed Drain Current	V_{GS}= 10V	(Note 3)	I_{DM}	22	A
Continuous Source Current (Body Diode)		(Note 2)	I_S	5.4	A
Pulsed Source Current (Body Diode)		(Note 3)	I_{SM}	22	A

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

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 1)	P_D	2	W
Linear Derating Factor			16	mW/°C
	(Note 2)		3.9	W
			31	mW/°C
Thermal Resistance, Junction to Ambient	(Note 3)	$R_{\theta JA}$	62.5	°C/W
	(Note 2)		32.2	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes: 1. For a device surface mounted on 25mm x 25mm FR-4 PCB with high coverage of single sided 1oz copper, in still air conditions.
2. For a device surface mounted on FR-4 PCB measured at t ≦ 5 seconds.
3. Repetitive rating 25mm x 25mm FR-4 PCB, D = 0.05, pulse width 10μs - pulse width limited by maximum junction temperature.

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	40	–	–	V	I_D = 250μA, V_{GS} = 0V
Zero Gate Voltage Drain Current	I_{DSS}	–	–	1	μA	V_{DS} = 40V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	–	–	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	1	–	2	V	I_D = 250μA, V_{DS} = V_{GS}
Static Drain-Source On-Resistance (Note 8)	$R_{DS(ON)}$	–	–	0.05	Ω	V_{GS} = 10V, I_D = 4.5A
				0.075		V_{GS} = 4.5V, I_D = 3.2A
Forward Transconductance	g_{fs}	–	8.7	–	S	V_{DS} = 15V, I_D = 2.5A
Diode Forward Voltage (Note 8)	V_{SD}	–	0.8	0.95	V	I_S = 2.5A, V_{GS} = 0V, T_J = +25°C
Reverse Recovery Time (Note 9)	t_{RR}	–	19.86	–	ns	I_F = 2.5A, di/dt = 100A/μs, T_J = +25°C
Reverse Recovery Charge (Note 9)	Q_{RR}	–	16.36	–	nC	
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	–	770	–	pF	V_{DS} = 40V, V_{GS} = 0V f = 1MHz
Output Capacitance	C_{oss}	–	92	–	pF	
Reverse Transfer Capacitance	C_{rss}	–	61	–	pF	
Total Gate Charge	Q_g	–	18.2	–	nC	V_{DS} = 30V, V_{GS} = 10V, I_D = 2.5A (Refer to test circuit)
Gate-Source Charge	Q_{gs}	–	2.1	–	nC	
Gate-Drain Charge	Q_{gd}	–	4.5	–	nC	
Turn-On Delay Time	$t_{D(ON)}$	–	2.55	–	ns	V_{DD} = 30V, V_{GS} = 10V I_D = 2.5A, R_G = 6Ω (Refer to test circuit)
Turn-On Rise Time	t_r	–	4.45	–	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	–	28.61	–	ns	
Turn-Off Fall Time	t_f	–	7.35	–	ns	

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

RATING AND CHARACTERISTICS CURVES (RM7N40S4)

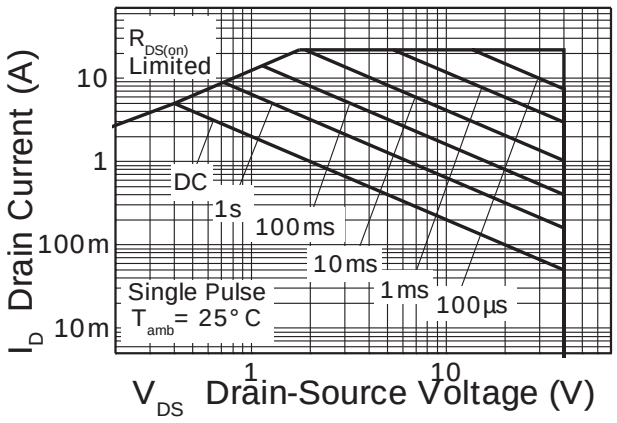

FIG 1,Safe Operating Area

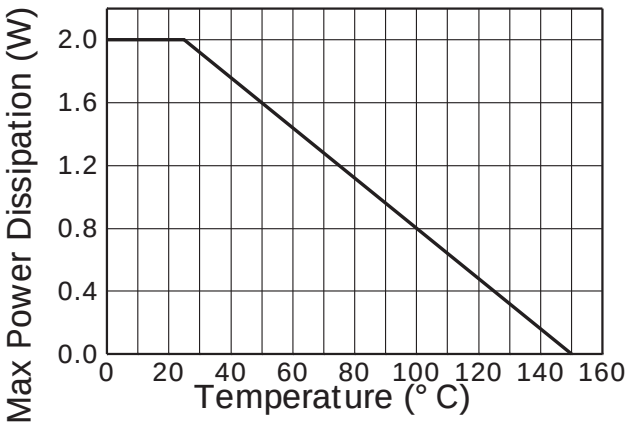

FIG 2,Derating Curve

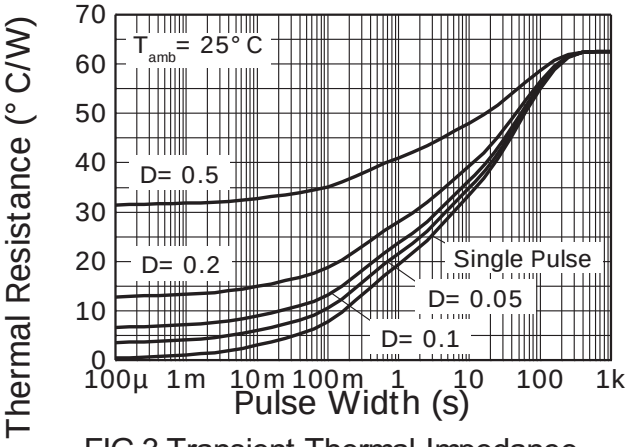

FIG 3,Transient Thermal Impedance

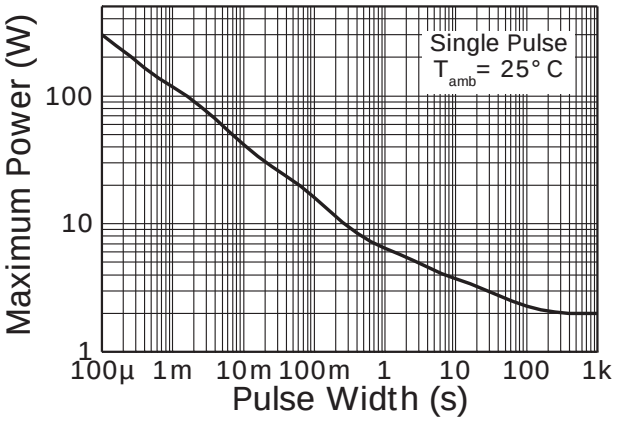

FIG 4,Pulse Power Dissipation

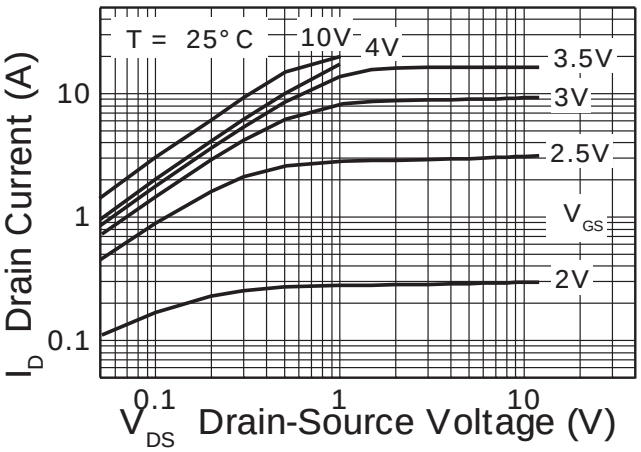

FIG 5,Output Characteristics

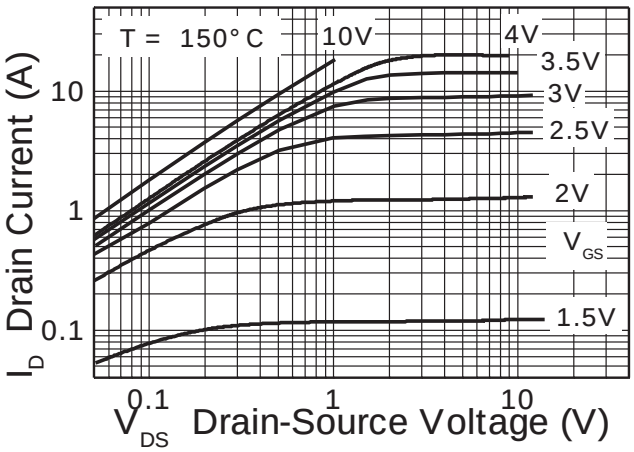

FIG 6,Output Characteristics

RATING AND CHARACTERISTICS CURVES (RM7N40S4)

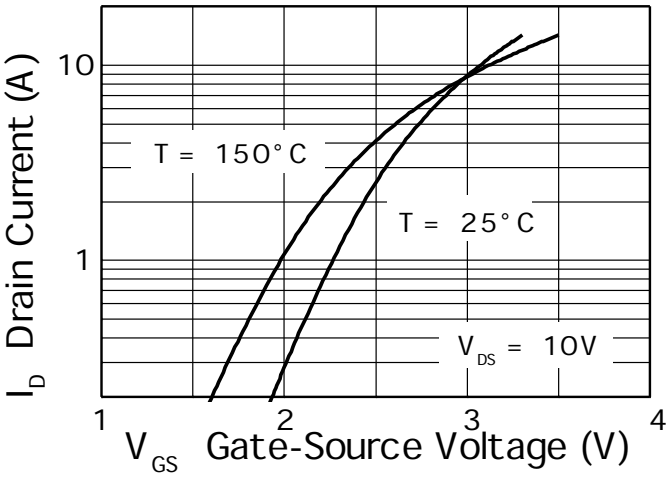

FIG 7,Typical Transfer Characteristics

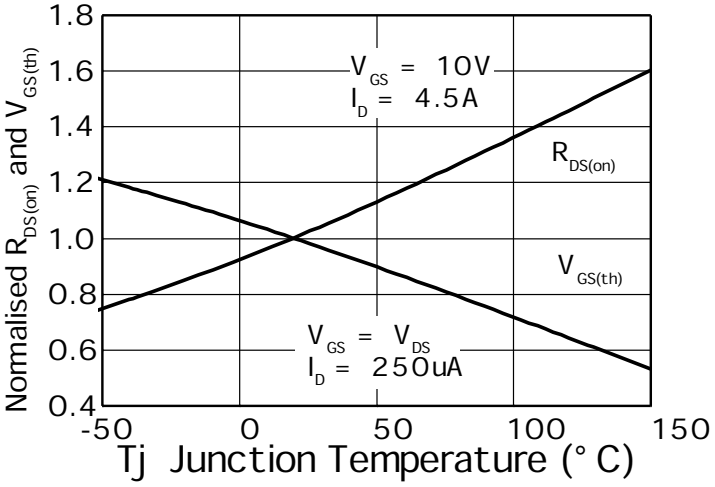

FIG 8,Normalised Curves v Temperature

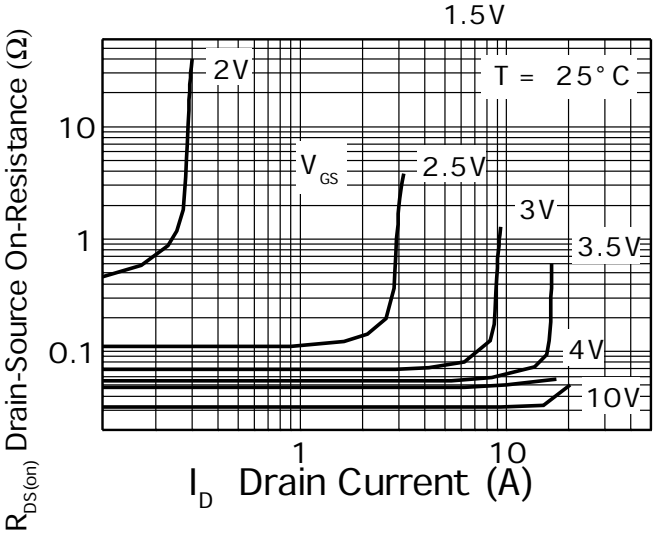

FIG 9,On-Resistance v Drain Current

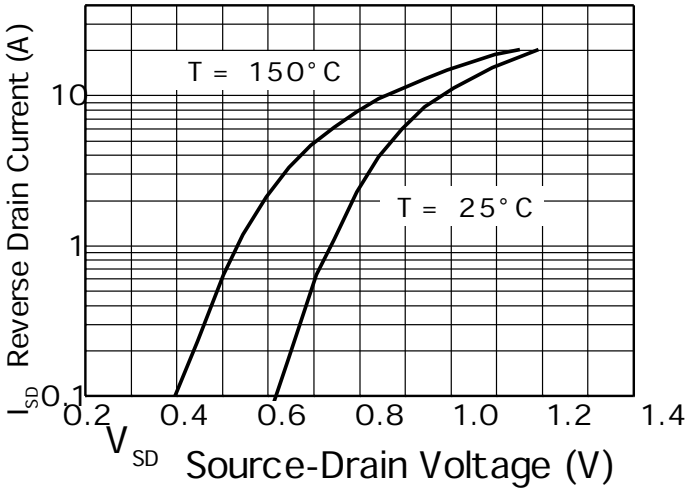

FIG 10,Source-Drain Diode Forward Voltage

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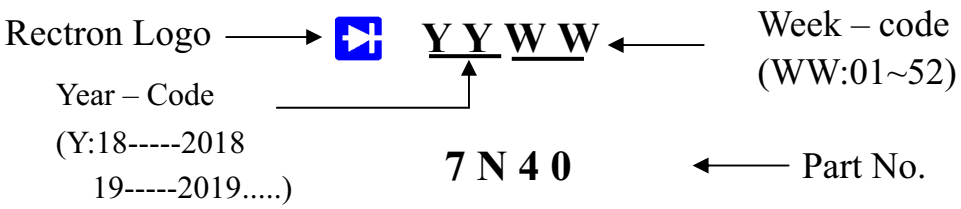
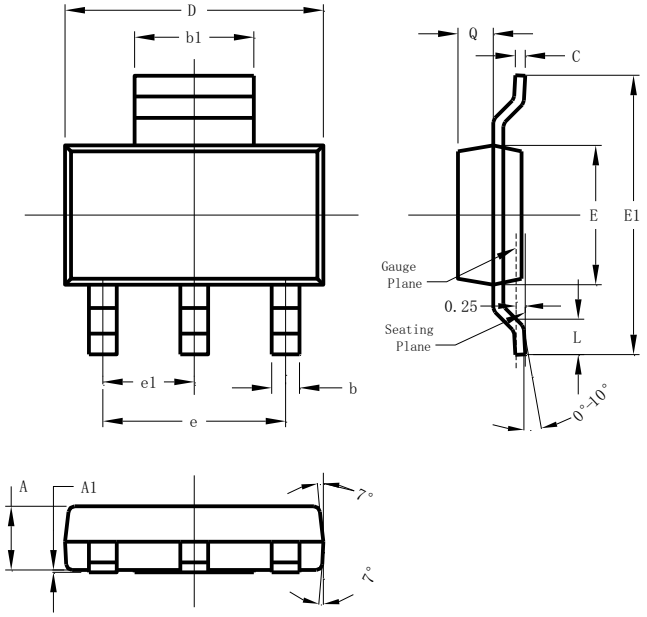
Marking on the body

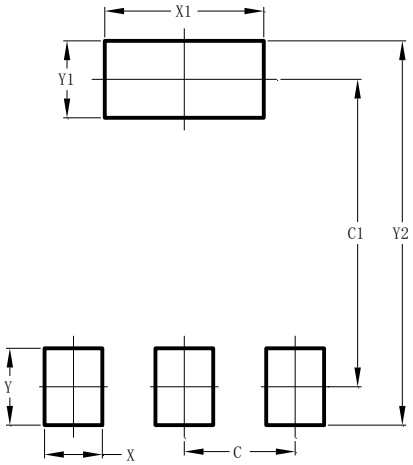


Package Outline Dimensions



SOT223			
Dim	**Min**	**Max**	**Typ**
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b	0.60	0.80	0.70
b1	2.90	3.10	3.00
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	-	-	4.60
e1	-	-	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
C	2.30
C1	6.40
X	1.20
X1	3.30
Y	1.60
Y1	1.60
Y2	8.00

Package	Tube (pcs/tube)	Tube (pcs/inner box)	Tube (pcs/cartoon)	Tape&Reel (pcs/reel)	Tape&Reel (pcs/inner box)	Tape&Reel (pcs/cartoon)
DFN5x6/DFN3x3	100	10,000	100,000	2,500	5,000	40,000
DFN1006	——	——	——	10,000	10,000	400,000
SOP-8	100	10,000	100,000	4,000	4,000	20,000
TSSOP-8	100	32,000	128,000	3,000	6,000	48,000
SOT-23-3L	——	——	——	3,000	30,000	120,000
SOT-23-6L	——	——	——	3,000	30,000	120,000
SOT-23(6R)	——	——	——	3,000	30,000	120,000
SOT-363	——	——	——	3,000	30,000	120,000
SOT-523	——	——	——	3,000	30,000	120,000
SOT223	——	——	——	2,500	2,500	20,000
TO-220	50	1,000	5,000	——	——	——
TO-220F	50	1,000	10,000	——	——	——
TO-247	30	300	1,200	——	——	——
TO-251	80	4,000	40,000	——	——	——
TO-251S(4R)	80	4,000	40,000	——	——	——
TO-252-2L(4R)	80	4,000	40,000	2,500	2,500	25,000
TO-263-2L	50	1,000	10,000	800	800	8,000
TO-3P	30	300	3,000	——	——	——
TO-92	——	——	——	1,000(袋装)	10,000	100,000

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