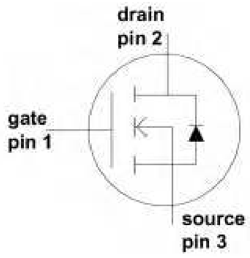
RECTRON
SEMICONDUCTOR
TECHNICAL SPECIFICATION

RM31N650HD

Super-junction Power Mosfet

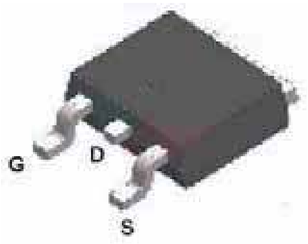
Features

- 650V,31A
  $R_{DS(ON)}$ 〈100mΩ @V_{GS}=10V TYP: 90mΩ
- Super junction technology
- Extremely low on resistance



Applications

- LED/LCD/PDP TV and monitor Lighting
- Solar/Renewable/UPS-Micro Inverter System
- Charger
- Power Supply
- Halogen-free



TO-263 top view

Package Marking and Ordering Information

Device Marking	Device	Package	Packaging Code	Reel Size	Quantity(Pcs)	Carton(Pcs)
31N650	RM31N650HD	TO-263	-W	13inch	800	6400

ABSOLUTE MAXIMUM RATINGS (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current (T_c =25℃)	I_D	31	A
Continuous Drain Current (T_c=100℃)	I_D	20	A
Pulsed Drain Current (1)	I_{DM}	93	A
Single Pulsed Avalanche Energy (2)	E_{AS}	480	mJ
Drain Power Dissipation	P_D	321	W
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.39	℃/W
Thermal Resistance- Junction to Ambient	$R_{\theta JA}$	62	℃/W
Junction Temperature	T_J	150	℃
Storage Temperature	T_{STG}	-55~ +150	℃

MOSFET ELECTRICAL CHARACTERISTICS(T_J=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =250μA	650	-	-	V
		V_{GS} = 0V, I_D =250μA T_j=150℃	700			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =650V, V_{GS} = 0V	-	-	5	uA
		V_{DS} =650V, V_{GS} = 0V T_j=150℃			800	uA
Gate-body leakage current	I_{GSS}	V_{GS} =±30V, V_{DS} = 0V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	3.0	-	5.0	V
Forward Transconductance	g_{FS}	V_{DS}=20V,I_D=17A	-	19.0	-	S
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =10V, I_D =17A	-	90	99	mΩ
Dynamic characteristics						
Input Capacitance	C_{iss}	V_{DS} =100V, V_{GS} =0V, f =1.0MHz	-	1900	-	pF
Output Capacitance	C_{oss}		-	118	-	
Reverse Transfer Capacitance	C_{rss}		-	2.2	-	
Gate Resistance	Rg	f =1.0MHz		0.9		Ω
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	V_{DD}=400V, I_D=17A, R_G=27Ω, V_G=10V	-	50	-	ns
Turn-on rise time	t_r		-	80	-	
Turn-off delay time	$t_{d(off)}$		-	180	-	
Turn-off fall time	t_f		-	50	-	
Total Gate Charge	Qg	V_{DS}=480V, I_D=17A, V_{GS}=10V	-	70	-	nC
Gate-Source Charge	Qgs		-	17.0	-	
Gate-Drain Charge	Qgd		-	45	-	
Source-Drain Diode characteristics						
Diode Forward voltage	V_{SD}	T_c=25℃, V_{GS} =0V, I_S=17A	-	0.9	1.1	V
Diode Forward current	I_S	T_c =25℃	-	-	31	A
Body Diode Reverse Recovery Time	trr	T_c=25℃，IF=17A,di/dt=100A/us		140		ns
Body Diode Reverse Recovery Charge	Qrr	T_c=25℃，IF=17A,di/dt=100A/us		0.89		uc

Notes:

1. Pluse width limited by maximum junction temperature
2. L=60mH, IAS=4A, VG=10V, RG=30Ω, starting TJ=25°C
3. Pulse Test: Pulse width ≤300μs, Duty cycle≤2%
4. Essentially independent of operating temperature

RATING AND CHARACTERISTICS CURVES (RM31N650HD)

Figure1. Safe operating area

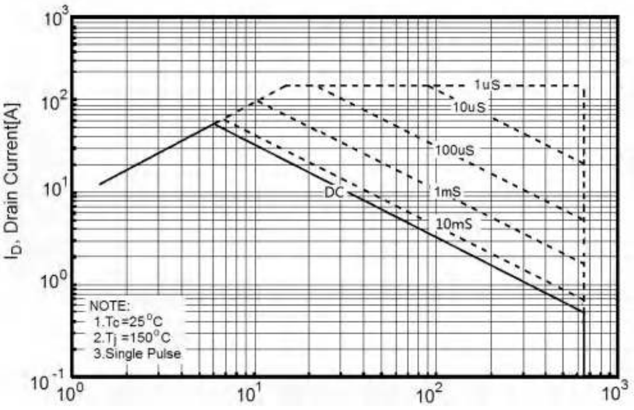


Figure2. Capacitance

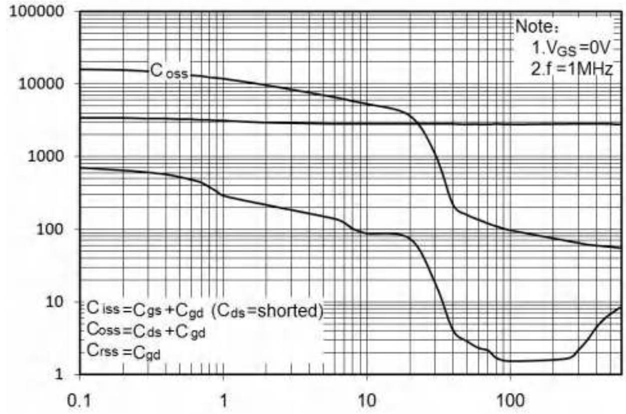


Figure3. Source-Drain Diode Forward Voltage

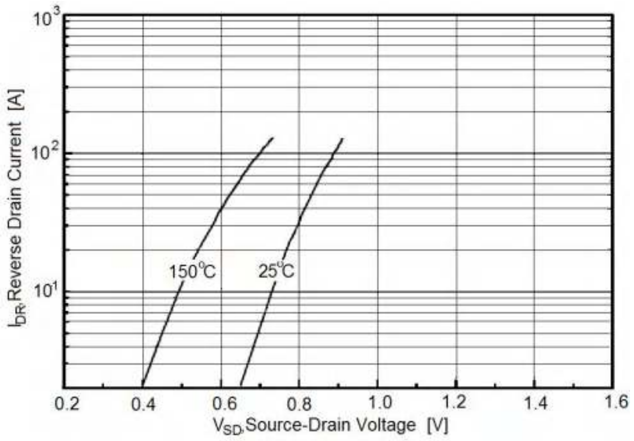


Figure4. Output characteristics

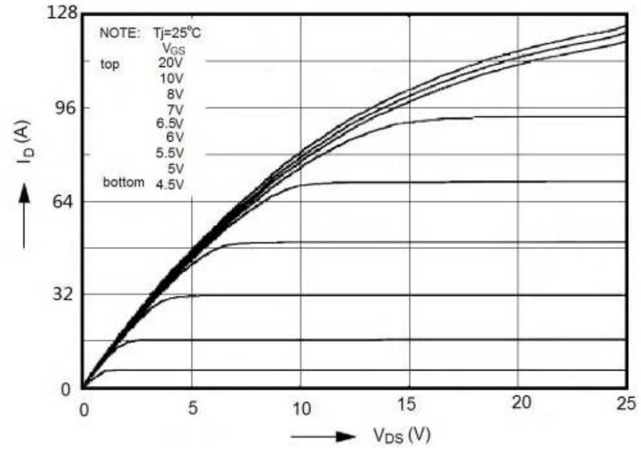


Figure5. Transfer characteristics

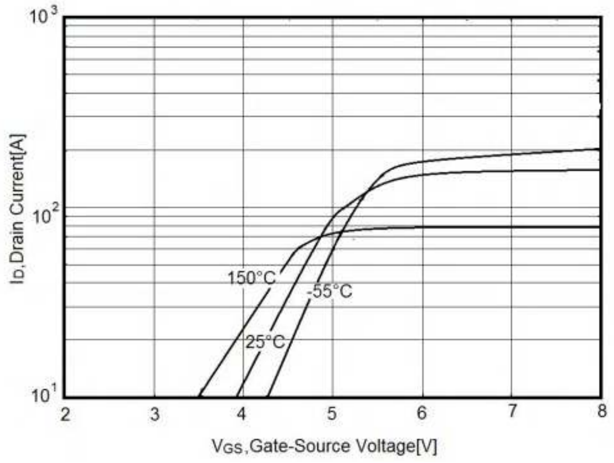
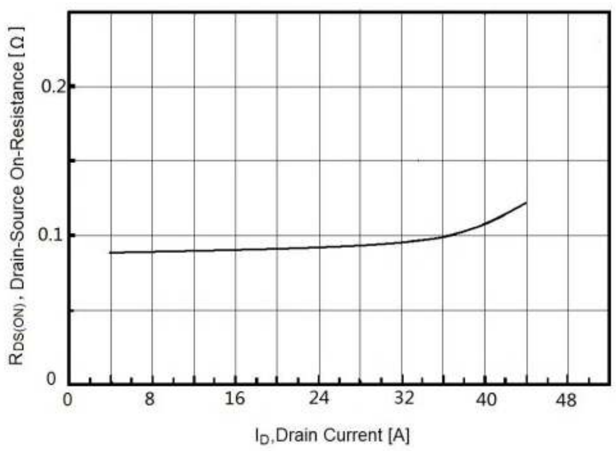


Figure6. Static drain-source on resistance



RATING AND CHARACTERISTICS CURVES (RM31N650HD)

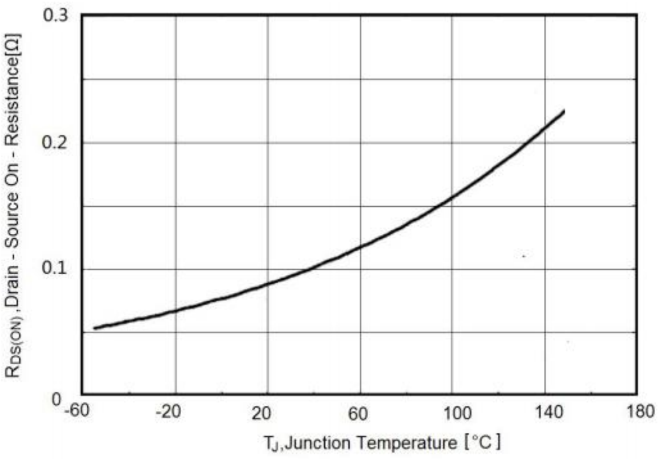


Figure7. $R_{DS(ON)}$ vs Junction Temperature

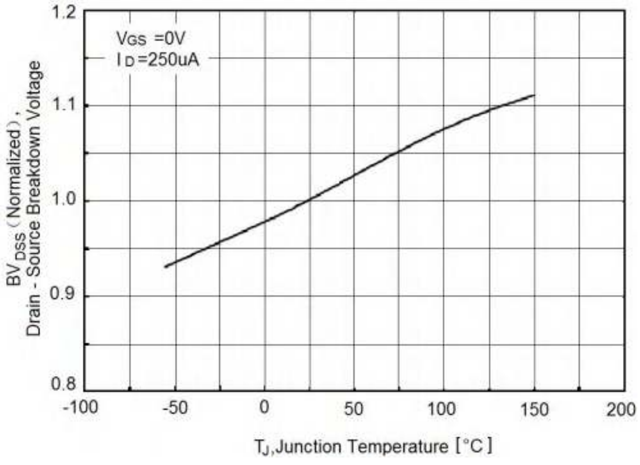


Figure8. BV_{DSS} vs Junction Temperature

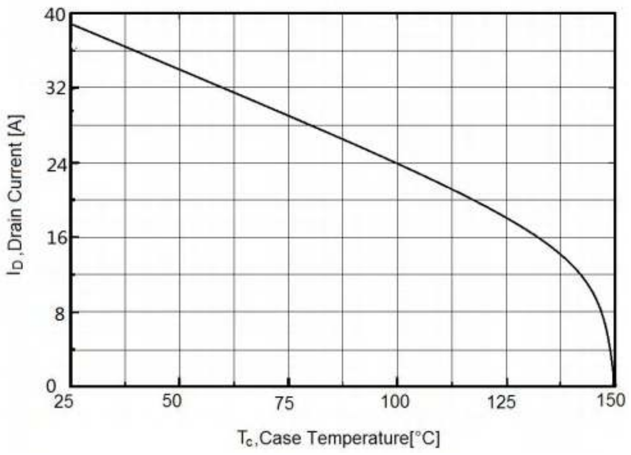


Figure9. Maximum I_D vs Junction Temperature

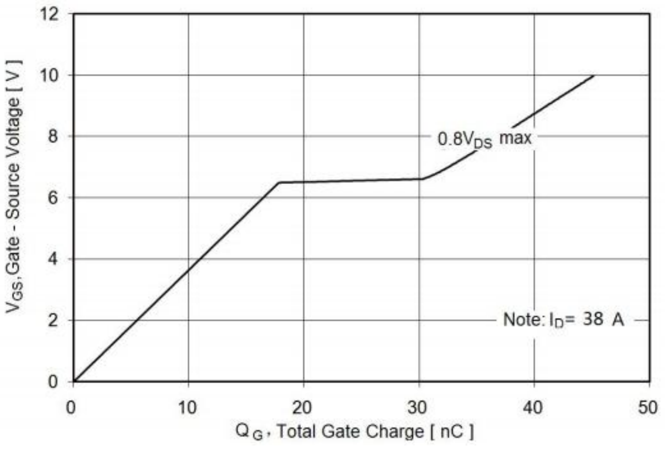


Figure10. Gate charge waveforms

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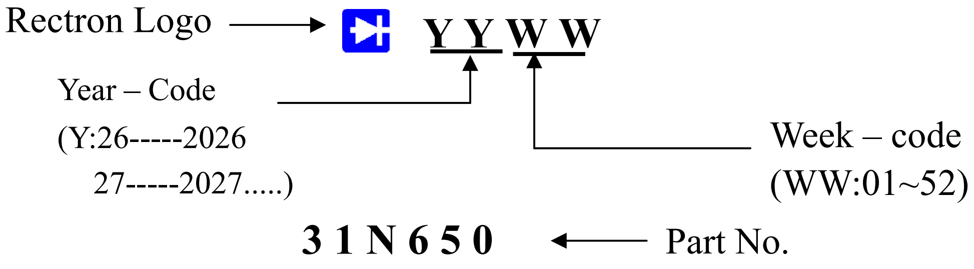
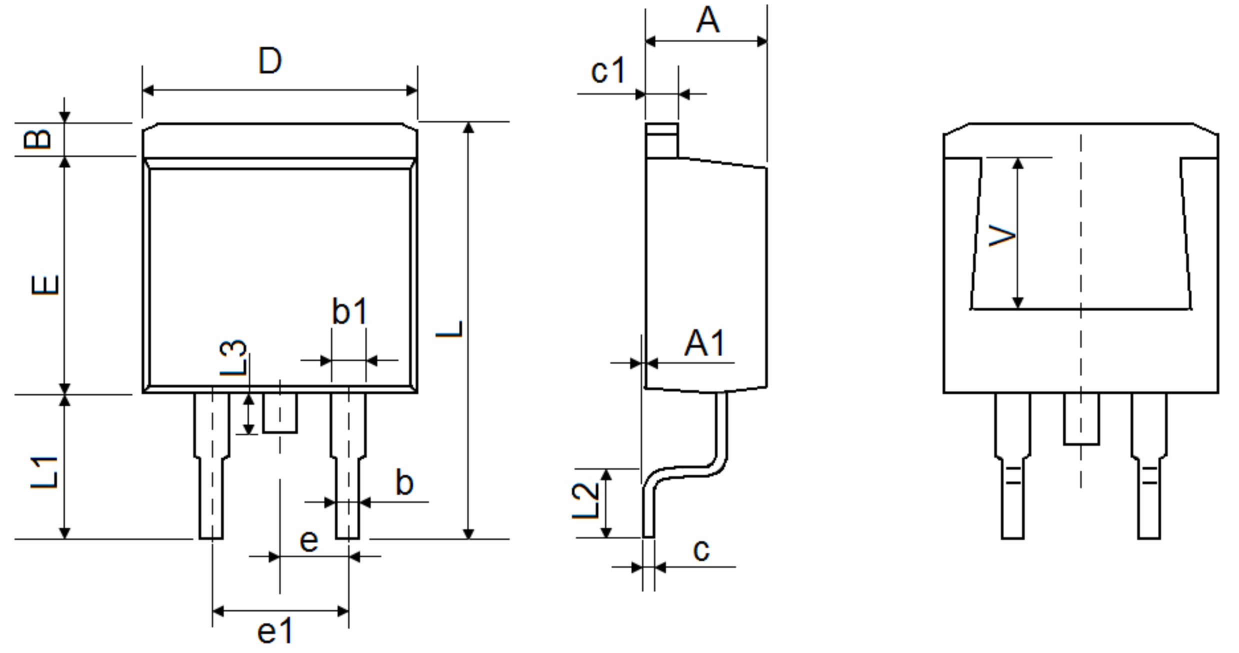
Marking on the body



TO-263 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.470	4.670	0.176	0.184
A1	0.000	0.150	0.000	0.006
B	1.170	1.370	0.046	0.054
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
L	15.050	15.450	0.593	0.608
L1	5.080	5.480	0.200	0.216
L2	2.340	2.740	0.092	0.108
L3	1.300	1.700	0.051	0.067
V	5.600 REF		0.220 REF	

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