1.3Ω, 650V, Super Junction N-Channel Power MOSFET SRC65R1K3ES

General Description

The Sanrise SRC65R1K3ES is a high voltage power MOSFET, fabricated using advanced super junction technology. The resulting device has extremely low on resistance, low gate charge and fast switching time, making it especially suitable for applications which require superior power density and outstanding efficiency.

The SRC65R1K3ES break down voltage is 650V and it has a high rugged avalanche characteristics.

The SRC65R1K3ES is available in TO-251, TO-252, TO-220F and TO-220F Narrow packages.

Features

- Ultra Low $R_{DS(ON)}$ = 1.3Ω @ V_{GS} = 10V.
- Ultra Low Gate Charge, Qg=8.0nC typ.
- Fast switching capability
- Robust design with better EAS performance
- EMI Improved **(*SnowMOS™* Gen.2)**

Application

- TV Power
- High Performance Charger / Adapter
- LED Lighting Power

Symbol

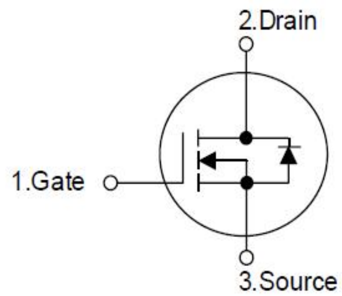

Figure 1 Symbol of SRC65R1K3ES

Package Type

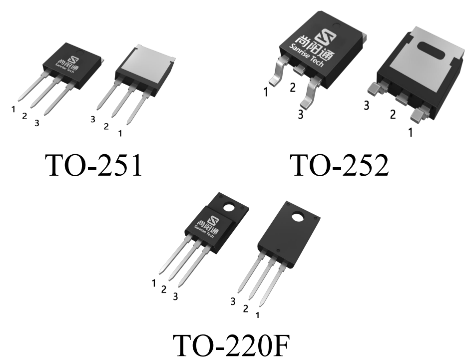

Figure 2 Package Types of SRC65R1K3ES

Ordering Information

SRC65R1K3ES□□–□

Circuit Type

Package
D1: TO-251
D: TO-252
TF: TO-220F
TFN: TO-220F Narrow

Blank: Tube
TR: Tape & Reel

E: Lead Free
G: Green

Package	Part Number	Marking ID	Packing Type
TO-251	SRC65R1K3ESD1-G	SRC65R1K3ESD1G	Tube
TO-252	SRC65R1K3ESDTR-G	SRC65R1K3ESDG	Tape & Reel
TO-220F	SRC65R1K3ESTF-G	SRC65R1K3ESTFG	Tube
TO-220F Narrow	SRC65R1K3ESTFN-G	SRC65R1K3ESTFNG	Tube

Absolute Maximum Ratings

Parameter		Symbol	Rating	Unit
Drain-Source Voltage (Note2)		V_{DSS}	650	V
Gate-Source Voltage		V_{GSS}	±30	V
Continuous Drain Current	T_C=25°C	I_D	3.2	A
	T_C=125°C		1.5	
Power Dissipation （Tc=25 ℃ ,TO-220F,TO-220F Narrow）		P_{tot}	14.5	W
Power Dissipation（Tc=25℃,TO-252, ,TO-251）		P_{tot}	30.8	W
Pulsed Drain Current (Note 3)		I_{DM}	9.8	A
Avalanche Energy, Single Pulse (Note 4)		E_{AS}	50	mJ
Avalanche Energy, Repetitive (Note 3)		E_{AR}	0.1	mJ
Avalanche Current, Repetitive (Note 3)		I_{AR}	0.8	A
Continuous Diode Forward Current		I_S	3.2	A
Diode Pulse Current		$I_{S.PULSE}$	9.8	A
Operating Junction Temperature		T_J	150	°C
Storage Temperature		T_{STG}	-55 to 150	°C
Lead Temperature (Soldering, 10 sec)		T_{LEAD}	260	°C

Note:

1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. For voltage spike during switching.
3. Repetitive Rating: Pulse width limited by maximum junction temperature
4. I_{AS} = 0.8A, V_{DD} = 60V, R_G = 25Ω, Starting T_J = 25°C

Thermal Resistance

Parameter		Symbol	Min	Typ	Max	Unit
Thermal resistance, Junction-to-Case	TO-220F	R_{thJC}			8.6	°C /W
	TO-220F Narrow				8.6	
	TO-252				4.3	
	TO-251				4.3	
Thermal resistance, Junction-to-Ambient	TO-220F	R_{thJA}			62	°C /W
	TO-220F Narrow				62	
	TO-252				62	
	TO-251				62	

Electrical Characteristics

T_J = 25 ºC, unless otherwise specified.

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250uA	650			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=650V, V_{GS}=0V			1	uA
Gate-Body Leakage Current — Forward	I_{GSSF}	V_{GS}=30V, V_{DS}=0V			100	nA
Gate-Body Leakage Current — Reverse	I_{GSSR}	V_{GS}=-30V, V_{DS}=0V			-1.0	uA
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250uA	2.2	3.2	4.2	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=1.5A		1.07	1.3	Ω
Gate Resistance	R_G	f=1MHz, Open Drain		97		Ω
Dynamic Characteristics						
Input Capacitance	C_{ISS}	V_{DS}=50V, V_{GS}=0V, f=1MHz		165		pF
Output Capacitance	C_{OSS}			13.5		
Reverse Transfer Capacitance	C_{RSS}			7.9		
Effective output capacitance, energy related NOTE5	$C_{O(er)}$	V_{GS}=0V, V_{DS}=0…480V		6.8		pF
Effective output capacitance, time related NOTE6	$C_{O(tr)}$			30.6		
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=400V, I_D=1.5A R_G=10.2Ω, V_{GS}=10V		30		ns
Rise Time	t_r			33		
Turn-off Delay Time	$t_{d(off)}$			71		
Fall Time	t_f			27		
Gate Charge Characteristics						
Gate to Source Charge	Q_{gs}	V_{DD}=480V, I_D=1.5A V_{GS}=0 to 10V		1.2		nC
Gate to Drain Charge	Q_{gd}			4.3		
Gate Charge Total	Q_g			8.0		
Gate Plateau Voltage	$V_{plateau}$			5.6		V
Reverse Diode Characteristics						
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_{SD}=1.5A		0.83	1.1	V
Reverse Recovery Time	t_{rr}	V_R=400V, I_F=1.5A dI_F/dt=100A/us		108		ns
Reverse Recovery Charge	Q_{rr}			0.44		uC
Peak Reverse Recovery Current	I_{rrm}			8.2		A

Note:

5. $C_{O(er)}$ is a fixed capacitance that gives the same stored energy as C_{OSS} while V_{DS} is rising from 0 to 480V

6. $C_{O\,(tr)}$ is a fixed capacitance that gives the same charging time as C_{OSS} while V_{DS} is rising from 0 to 480 V

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