

15A 650V Trench Fieldstop IGBT with anti-parallel diode SRE15N065FSU2DJ

General Description

The SRE15N065FSU2DJ is a Field Stop Trench IGBT with anti-parallel diode, which offers ultra-low switching losses, high energy efficiency for switching applications such as PFC, Power Supply, Inverter, etc.

The SRE15N065FSU2DJ is available in TO-220F、TO-220C and TO-263 packages.

Features

- High Breakdown Voltage to 650V
- Advanced Trench Fieldstop technology
 - Ultra low E_{off}
 - High Ruggedness, Temperature Stability
 - Easy Parallel Switching Capability due to Positive Temperature Coefficient in $V_{CE(SAT)}$
- Low $V_{CE(SAT)}$
- Enhanced Avalanche Capability
- Non-Automotive Qualified

Application

- Inverter
- Uninterruptible power supplies
- PFC application
- Converter with high switching frequency

Symbol

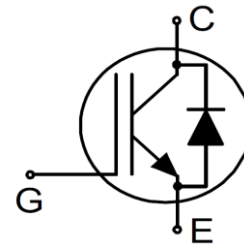
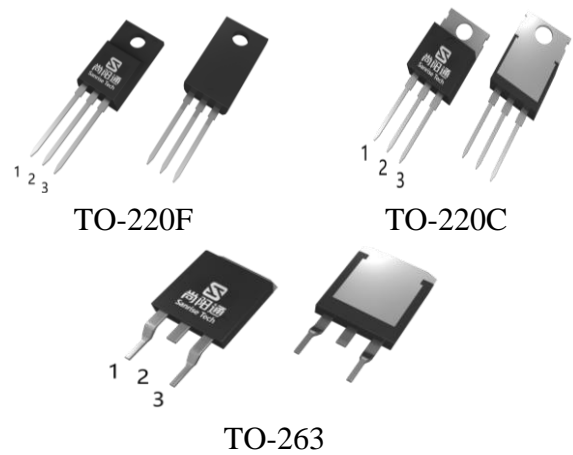


Figure 1 Symbol of SRE15N065FSU2DJ

Package Type



Pin 1- Gate
 Pin 2&backside- Collector
 Pin 3-Emitter

Figure 2 Package Type of SRE15N065FSU2DJ

Ordering Information

SRE15N065FSU2DJ □ □ - □

Circuit Type			
Package			
S2: TO-263; TF: TO-220F; TC:TO-220C			G: Green Blank: Tube TR: Tape & Reel

Package	Part Number	Marking ID	Packing Type
TO-220F	SRE15N065FSU2DJTF-G2	SRE15N065FSU2DJTFG2	Tube
TO-220C	SRE15N065FSU2DJTC-G2	SRE15N065FSU2DJTCG2	Tube
TO-263	SRE15N065FSU2DJS2TR-G2	SRE15N065FSU2DJS2TRG2	Tape & Reel

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Absolute Maximum Ratings

Parameter		Symbol	Rating	Unit
Collector-emitter Voltage		V_{CES}	650	V
Gate-emitter Voltage		V_{GES}	± 20	V
Transient Gate-emitter Voltage			± 30	V
Continuous Collector Current	$T_C=25^\circ\text{C}$	I_C	30	A
	$T_C=100^\circ\text{C}$		15	
Pulsed Collector Current, Limited by T_{Jmax}		I_{CM}	60	A
Diode Continuous Collector Current	$T_C=25^\circ\text{C}$	I_F	30	A
	$T_C=100^\circ\text{C}$		15	
Diode Pulsed Current, Limited by T_{Jmax}		I_{FM}	60	A
Short circuit withstand time ($V_{GE}=15\text{V}, V_{CC} \leq 400\text{V}, T_{Jstart}=25^\circ\text{C}$)		t_{sc}	8	us
Power Dissipation (TO220C & TO-263 Packages)	$T_C=25^\circ\text{C}$	P_{tot}	50	W
	$T_C=100^\circ\text{C}$		25	
Power Dissipation (TO-220F Package)	$T_C=25^\circ\text{C}$	P_{tot}	30	W
	$T_C=100^\circ\text{C}$		15	
Operating Junction Temperature Range		T_J	-40 ~ 175	$^\circ\text{C}$
Storage Temperature Range		T_{STG}	-55 ~ 150	$^\circ\text{C}$
Lead Temperature (Soldering, 10 sec)		T_{LEAD}	260	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
IGBT Thermal Resistance, Junction-to-Case (TO220C & TO-263 Packages)	R_{thJC}	-	-	3.0	$^\circ\text{C}/\text{W}$
Diode Thermal Resistance, Junction-to-Case (TO220C & TO-263 Packages)	R_{thJC}	-	-	4.0	
Thermal Resistance, Junction-to-Ambient (TO220C & TO-263 Packages)	R_{thJA}	-	-	40	
IGBT Thermal Resistance, Junction-to-Case (TO-220F Package)	R_{thJC}			5.0	
Diode Thermal Resistance, Junction-to-Case (TO-220F Package)	R_{thJC}			6.5	
Thermal Resistance, Junction-to-Ambient (TO-220F Package)	R_{thJA}			62	

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Electrical Characteristics

 T_J = 25°C, unless otherwise specified.

Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Statistic Characteristics								
Collector-emitter Voltage	Breakdown	BV _{CES}	V _{GE} =0V, I _C =250μA	650			V	
Gate Threshold Voltage		V _{GE(th)}	V _{CE} =V _{GE} , I _C =250μA	4.4	5.2	6.0	V	
Collector-emitter saturation voltage		V _{CESat}	V _{GE} =15V, I _C =15A, T _J =25°C		1.38	1.5	V	
			T _J =125°C		1.59		V	
			T _J =175°C		1.70		V	
Zero Gate Voltage Collector Current		I _{CES}	V _{CE} =650V, V _{GE} =0V T _J =25°C		0.1	40	μA	
			T _J =175°C			1	mA	
Gate-emitter Leakage Current	Forward	I _{GESF}	V _{GE} =20V, V _{CE} =0V			100	nA	
	Reverse	I _{GESR}	V _{GE} =-20V, V _{CE} =0V			-100	nA	
Dynamic Characteristics								
Input Capacitance		C _{IES}	V _{CE} =25V, V _{GE} =0V, f=100KHz		678		pF	
Output Capacitance		C _{OES}			54			
Reverse Transfer Capacitance		C _{RES}			13			
Gate Resistance		R _G	f=1 MHz, Open Drain		1.5		Ω	
Turn-on Delay Time		t _{d(on)}	T _J =25°C V _{CC} =400V, I _C =15A R _G =10Ω, V _{GE} =0/15V Energy losses include "tail" and diode reverse recovery		12		ns	
Rise Time		t _r			11		ns	
Turn-off Delay Time		t _{d(off)}			38		ns	
Fall Time		t _f			66		ns	
Turn-on energy		E _{on}			0.26		mJ	
Turn-off energy		E _{off}			0.26		mJ	
Total switching energy		E _{ts}			0.56		mJ	
Turn-on Delay Time		t _{d(on)}		T _J =175°C V _{CC} =400V, I _C =15A R _G =10Ω, V _{GE} =0/15V Energy losses include "tail" and diode reverse recovery		12		ns
Rise Time		t _r				11		ns
Turn-off Delay Time		t _{d(off)}				45		ns
Fall Time		t _f			99		ns	
Turn-on energy		E _{on}			0.31		mJ	
Turn-off energy		E _{off}			0.36		mJ	
Total switching energy		E _{ts}			0.67		mJ	
Gate to Emitter Charge		Q _{GE}	V _{CC} =400V, I _C =15A V _{GE} =0 to 15V			10		nC
Gate to Collector Charge		Q _{GC}			19			
Gate Charge Total		Q _G			43			

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Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Reverse Diode Characteristics						
Diode Forward Voltage	V_F	$I_F=7.5A$ $T_J=25^\circ C$		1.6	2.0	V
		$I_F=7.5A$ $T_J=125^\circ C$		1.38		
		$I_F=7.5A$ $T_J=175^\circ C$		1.25		
		$I_F=15A$ $T_J=25^\circ C$		1.85	2.2	
		$I_F=15A$ $T_J=125^\circ C$		1.64		
		$I_F=15A$ $T_J=175^\circ C$		1.55		
Reverse Recovery Time	t_{rr}	$T_J=25^\circ C$ $V_R=400V, I_F=7.5A$ $R_G=10\Omega$ $dI_F/dt=1180A/\mu s$		51		ns
Reverse Recovery Charge	Q_{rr}			0.23		μC
Peak Reverse Recovery Current	I_{rrm}			8.5		A
Diode peak rate of fall off reverse recovery current	dI_{rr}/dt			-220		$A/\mu s$
Reverse recovery energy	E_{rec}			0.13		mJ
Reverse Recovery Time	t_{rr}		$T_J=175^\circ C$ $V_R=400V, I_F=7.5A$ $R_G=10\Omega$ $dI_F/dt=1330A/\mu s$		100	
Reverse Recovery Charge	Q_{rr}			0.65		μC
Peak Reverse Recovery Current	I_{rrm}			15		A
Diode peak rate of fall off reverse recovery current	dI_{rr}/dt			-200		$A/\mu s$
Reverse recovery energy	E_{rec}			0.37		mJ
Reverse Recovery Time	t_{rr}	$T_J=25^\circ C$ $V_R=400V, I_F=15A$ $R_G=10\Omega$ $dI_F/dt=840A/\mu s$			85	
Reverse Recovery Charge	Q_{rr}			0.32		μC
Peak Reverse Recovery Current	I_{rrm}			9		A
Diode peak rate of fall off reverse recovery current	dI_{rr}/dt			-130		$A/\mu s$
Reverse recovery energy	E_{rec}			0.18		mJ
Reverse Recovery Time	t_{rr}		$T_J=175^\circ C$ $V_R=400V, I_F=15A$ $R_G=10\Omega$ $dI_F/dt=910A/\mu s$		149	
Reverse Recovery Charge	Q_{rr}			0.95		μC
Peak Reverse Recovery Current	I_{rrm}			15		A
Diode peak rate of fall off reverse recovery current	dI_{rr}/dt			-120		$A/\mu s$
Reverse recovery energy	E_{rec}			0.54		mJ



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