

General Description

The SRE40N065FSUR is a Field Stop Trench IGBT with monolithic body diode, which offers ultra-low switching losses, high energy efficiency for switching applications such as PFC, Power Supply, etc.

The SRE40N065FSUR is available in TO-247 package.

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

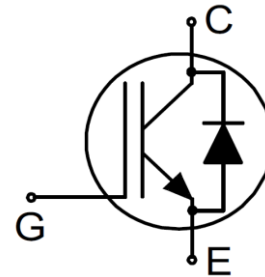
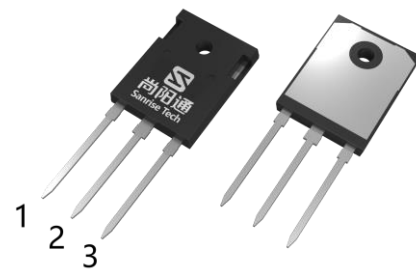


Figure 1 Symbol of SRE40N065FSUR

Package Type



TO-247

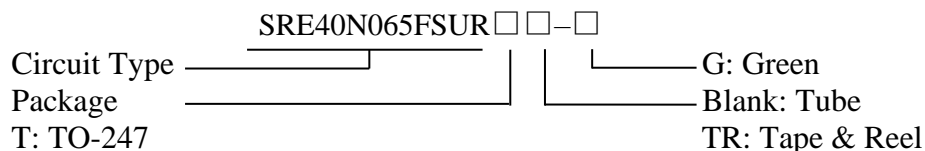
Pin 1- Gate

Pin 2&backside- Collector

Pin 3-Emitter

Figure 2 Package Type of SRE40N065FSUR

Ordering Information



Package	Part Number	Marking ID	Packing Type
TO-247	SRE40N065FSURT-G1	SRE40N065FSURTG1	Tube

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	60	A
	$T_C=100^\circ\text{C}$		40	
Pulsed Collector Current, Limited by T_{Jmax}		I_{CM}	160	A
Diode Continuous Collector Current	$T_C=25^\circ\text{C}$	I_F	60	A
	$T_C=100^\circ\text{C}$		40	
Diode Pulsed Current, Limited by T_{Jmax}		I_{FM}	120	A
Power Dissipation	$T_C=25^\circ\text{C}$	P_{tot}	189	W
	$T_C=100^\circ\text{C}$		76	
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	R_{thJC}	-	-	0.66	$^\circ\text{C}/\text{W}$
Diode Thermal Resistance, Junction-to-Case	R_{thJC}	-	-	0.66	
Thermal Resistance, Junction-to-Ambient	R_{thJA}	-	-	40	

Electrical Characteristics
 $T_J = 25^\circ\text{C}$, unless otherwise specified.

Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Statistic Characteristics								
Collector-emitter Voltage	Breakdown	BV_{CES}	$V_{GE}=0V, I_C=250\mu A$	650			V	
Gate Threshold Voltage		$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=250\mu A$	3.5	4.3	5.1	V	
Collector-emitter saturation voltage		V_{CEsat}	$V_{GE}=15V, I_C=40A,$ $T_J=25^\circ\text{C}$		1.54	2.04	V	
			$T_J=125^\circ\text{C}$		1.89		V	
			$T_J=175^\circ\text{C}$		2.08		V	
Zero Gate Voltage Collector Current		I_{CES}	$V_{CE}=650V, V_{GE}=0V$ $T_J=25^\circ\text{C}$		0.1	39	μA	
			$T_J=175^\circ\text{C}$			1	mA	
Gate-emitter Current	Leakage 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}	$V_{CE}=25V, V_{GE}=0V,$ $f=1\text{ MHz}$		1628		pF	
Output Capacitance		C_{OES}			140			
Reverse Transfer Capacitance		C_{RES}			28			
Gate Resistance		R_G	$f=1\text{ MHz, Open Drain}$		1.38		Ω	
Turn-on Delay Time		$t_{d(on)}$	$T_J=25^\circ\text{C}$ $V_{CC}=400V, I_C=40A$ $R_G=10\Omega, V_{GE}=0/15V$ Energy losses include "tail" and diode reverse recovery		15		ns	
Rise Time		t_r			8		ns	
Turn-off Delay Time		$t_{d(off)}$			110		ns	
Fall Time		t_f			104		ns	
Turn-on energy		E_{on}			1.0		mJ	
Turn-off energy		E_{off}			0.4		mJ	
Total switching energy		E_{ts}			1.4		mJ	
Turn-on Delay Time		$t_{d(on)}$		$T_J=150^\circ\text{C}$ $V_{CC}=400V, I_C=40A$ $R_G=10\Omega, V_{GE}=0/15V$ Energy losses include "tail" and diode reverse recovery		15		Ω
Rise Time		t_r				26		ns
Turn-off Delay Time		$t_{d(off)}$				89		ns
Fall Time		t_f			110		ns	
Turn-on energy		E_{on}			1.8		ns	
Turn-off energy		E_{off}			0.6		mJ	
Total switching energy		E_{ts}			2.4		mJ	
Gate to Emitter Charge		Q_{GE}	$V_{CC}=400V, I_C=40A$ $V_{GE}=0\text{ to }15V$		11		mJ	
Gate to Collector Charge		Q_{GC}			22			
Gate Charge Total		Q_G			35			

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Reverse Diode Characteristics						
Diode Forward Voltage	V_F	$I_F=20A$ $T_J=25^\circ C$		1.46	1.9	V
		$I_F=20A$ $T_J=125^\circ C$		1.63		
		$I_F=20A$ $T_J=175^\circ C$		1.71		
		$I_F=40A$ $T_J=25^\circ C$		1.78	2.18	
		$I_F=40A$ $T_J=125^\circ C$		2.1		
		$I_F=40A$ $T_J=175^\circ C$		2.26		
Reverse Recovery Time	t_{rr}	$T_J=25^\circ C$ $V_R=400V, I_F=40A$ $dI_F/dt=970A/\mu s$		118		ns
Reverse Recovery Charge	Q_{rr}			2.6		uC
Peak Reverse Recovery Current	I_{rrm}			34		A
Diode peak rate of fall of reverse Recovery current during t_b	di_{rr}/dt			-800		A/us
Reverse Recovery Time	t_{rr}	$T_J=150^\circ C$ $V_R=400V, I_F=40A$ $dI_F/dt=1100A/\mu s$		473		ns
Reverse Recovery Charge	Q_{rr}			4.5		uC
Peak Reverse Recovery Current	I_{rrm}			43		A
Diode peak rate of fall of reverse Recovery current during t_b	di_{rr}/dt			-900		A/us



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