Solid State Devices, Inc.
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SGF43E70-28

43 AMP
GaN FET Normally-Off
700 VOLTS, 39 mΩ typical

Designer's Data Sheet

Part Number/Ordering Information[1/]

SGF43E70 __ __

Screening[2/]
__ = Not Screened
TX = TX Level
TXV = TXV Level
S = S Level

Package
-28 = LCC28

FEATURES:
- 3rd Generation Gallium Nitride Technology
- Combines GaN HEMT and Low Voltage Si MOSFET (Cascode) for Superior Performance
- Works with Common Gate Drivers
- Low RDSon
- Low Q_g Simplifies Gate Drive Circuit
- Very Fast Switching for High Frequency Applications
- Low Thermal Resistance – Internal Heat Sink
- Hermetically Sealed Surface Mount Package
- Extremely Small Footprint and Low Profile
- TX, TXV, and S-Level Screening Available[2/]
- Available as Normally-On (without the Si Mosfet Driver)

APPLICATIONS:
- High Efficiency DC-DC / PoL Converters
- Motor Controller
- Military and Aerospace

BENEFITS:
- GaN Transistor offers superior advantages over Si based MOSFET: low Q_{RR}, low gate charge, low $R_{DS(ON)}$, fast switching speed and low temperature coefficient
- Benefits circuit designer through higher efficiency, lower cross-over losses and On-state losses
- Eliminates the need to add free-wheeling diode

Maximum Ratings[3/]		Symbol	Value	Unit
Continuous Drain - Source Voltage		V_{DSS}	700	V
Transient Drain - Source Voltage In off-state, spike duty cycle D < 0.01, spike duration < 1 µs		V_{TDS}	800	V
Gate – Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_C = 25°C	I_{D1}	43	A
	T_C = 100°C	I_{D2}	23	A
Pulsed Drain Current (T_{op} / P_{width} limited)	Pulse width = 10 µs	I_{D3}	240	A
Total Power Dissipation		P_D	83	W
Operating & Storage Temperature		T_{OP} & T_{STG}	-55 to +150	°C
Thermal Resistance (Junction to Case)		$R_{\theta JC}$	1.5	°C/W

NOTES:

1/ For ordering information, price, operating curves, and availability- contact factory.

2/ Screening based on MIL-PRF-19500. Screening flows available on request.

3/ Unless otherwise specified, all electrical characteristics @ 25°C.

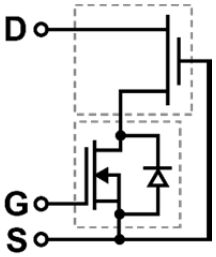
4/ Pulse test, P_W = 300 µs, D.C. = 2%.

LCC28

Extremely Small Footprint: 0.458" x 0.458"

Low Profile: .095" max (dime used for size reference)

Cascode Device Structure



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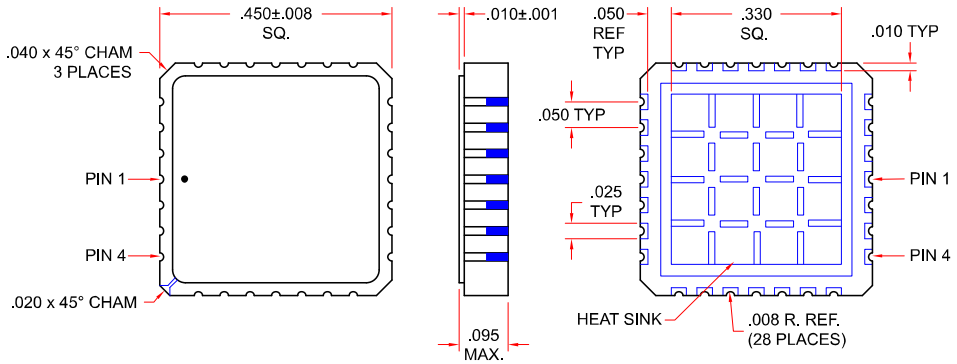
Electrical Characteristics[3/]		Symbol	Min	Typ	Max	Unit
Drain to Source Breakdown Voltage	I_D = 100 µA, V_{GS} = 0 V	V_{DSS}	700	-	-	V
Gate to Source Leakage	V_{GS} = 20V V_{GS} = -20V	I_{GSSF} I_{GSSR}	- -	- -	400 -400	nA
Drain to Source Leakage Current V_{DS} = 650 V, V_{GS} = 0 V	T_J = 25°C T_J = 150°C	I_{DSS}	- -	3 15	25 -	µA
Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 1mA	$V_{GS(th)}$	3.3	4	4.8	V
Drain to Source On State Resistance[4/] V_{GS} = 10 V, I_D = 30 A	T_J = 25°C T_J = 150°C	$R_{DS(on)}$	- -	39 76	45 -	mΩ
Total Gate Charge **Gate to Source Charge** **Gate to Drain Charge**	V_{DS} = 400 V I_D = 32 A	Q_g Q_{gs} Q_{gd}	- - -	24 10 6	36 - -	nC
Total Output Charge	V_{GS} = 0 V, V_{DS} = 0 V - 400 V	Q_{oss}	-	178	-	nC
Input Capacitance **Output Capacitance** **Reverse Transfer Capacitance**	V_{GS} = 0 V V_{DS} = 400 V f = 1 MHz	C_{iss} C_{oss} C_{rss}	- - -	1500 190 10	- - -	pF
Output Capacitance, Energy Related	V_{GS} = 0 V, V_{DS} = 0 V - 400 V	$C_{O(er)}$	-	290	-	pF
Output Capacitance, Time Related	V_{GS} = 0 V, V_{DS} = 0 V - 400 V	$C_{O(er)}$	-	440	-	pF
Turn-on Delay **Rise Time** **Turn-off Delay** **Fall Time**	V_{DS} = 400 V V_{GS} = 12 V I_D = 32 A R_G = 30 Ω	$t_{D(ON)}$ t_R $t_{D(OFF)}$ t_F	- - - -	69 14 99 12	- - - -	ns
Source to Drain Forward Current[4/]	V_{GS} = 0 V, T_C = 100°C	I_{SD}	-	-	29.5	A
Source to Drain Forward Voltage[4/]	I_S = 32 A, V_{GS} = 0 V I_S = 15 A, V_{GS} = 0 V	V_{SD}	- -	2.1 1.4	- -	V
Source to Drain Reverse Recovery Time	I_S = 30 A, V_{DD} = 400 V di/dt=1000 A/us	t_{RR}	-	65	-	ns
Source to Drain Reverse Recovery Charge	I_S = 30 A, V_{DD} = 400 V di/dt=1000 A/us	Q_{RR}	-	178	-	nC

LCC28 (-28)



PIN ASSIGNMENT	
Source*	**12 - 18**
Drain*	**1 – 5, 27, 28**
Gate	**9**
Substrate**	**19, heat sink**
GaN Gate**	**11, 20**

*All Drain / Source pins must be connected to maximize current capability and minimize $R_{DS(ON)}$
**Connect to SOURCE

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