Target specification 5SFG 0660A07500x

750 V, 660 A*

RoadPak SiC phase-leg module

- V_{DSS} = 750 V
- I_D = 2 x 660 A*
- Molded package optimized for EV application
- Pin-fin structure for lowest thermal resistance
- lowest losses thanks to Silicon Carbide chip-set
- main terminals with holes (screw connection) or without holes for welding

*Current rating based on chip rating times number of chips

Maximum rated values [1)]

Parameter	Symbol	Conditions	Min.	Max.	Unit
Drain-source voltage	V_{DS}	V_{GS} = 0 V, T_{vj} ≥ 25 °C		750	V
DC drain current	I_D	T_{Cool} = 55 °C, T_{vj} = 175 °C		660	A
Peak drain current	I_{DM}	t_p = 1 ms, duty cycle = 20%, T_{Cool} = 55 °C, T_{vj} = 175 °C		1130	A
Gate-source voltage	V_{GSS}		-4	15	V
Transient gate-source voltage [2)]	$V_{GSS,max}$	Maximum values under transient events < 50 ns	-8	19	V
DC reverse drain current (body diode)	I_{DR}	VGS = -4 V, T_{Cool} = 55 °C, T_{vj} = 175 °C		tbd	A
Peak reverse drain current (body diode)	I_{DRM}	VGS = -4 V, t_p = 1 ms		tbd	A
Surge source current (body diode)	I_{SSM}	VGS = -4 V		tbd	A
DC reverse drain current (channel open)	I_{DRS}	VGS = 15 V, T_{Cool} = 55 °C, T_{vj} = 175 °C		660	A
Surge source current (channel open)	I_{SSX}	VGS = 15 V		tbd	A
Isolation voltage	V_{isol}	1 min, f = 50 Hz		2500	V
Junction temperature	T_{vj}			175	°C
Junction operating temperature	$T_{vj(op)}$		-40	175	°C
Storage temperature	T_{stg}		-40	150	°C
Mounting torque	M_s	Module to cooler with M4 screws		2.8	Nm

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[1)] Maximum rated values indicate limits beyond which damage to the device may occur per IEC 60747
[2)] Based on chip capability

MOSFET characteristic values [3]

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0 V	Tvj = 175 °C	750			V
			Tvj = 25 °C	750			V
			Tvj = -40 °C	750			V
Static drain-source on-state resistance [4]	$R_{DS(on)}$	I_D = 540 A, V_{GS} = 15 V	T_{vj} = 25 °C		2.4	2.6	m□
			T_{vj} = 175 °C		4.2	4.8	m□
Zero gate voltage drain current	I_{DSS}	V_{DS} = 750 V, V_{GS} = 0 V	T_{vj} = 25 °C		2	10	uA
			T_{vj} = 175 °C		5	20	uA
Gate-source leakage current	I_{GSS}	V_{DS} = 0 V, V_{GS} = 15 V, T_{vj} = 25 °C				500	nA
Gate threshold voltage [2]	$V_{GS(th)}$	I_D = 180 mA, V_{DS} = V_{GS}, T_{vj} = 25 °C		1.8	2.4	3.6	V
Gate charge [2]	Q_G	I_D = 515 A, V_{DS} = 400 V, V_{GE} = -4 V ... +15 V			1.47		uC
Input capacitance [2]	C_{ISS}	V_{DS} = 750 V, V_{GS} = 0 V, T_{vj} = 25 °C, f = 100 kHz			39		nF
Internal gate resistance [2]	R_{Gint}				0.51		□
Turn-on switching energy	E_{on}	V_{DD} = 400 V, I_D = 515 A, R_G = 0.47 Ω, C_G = 94 nF, V_{GS} = -4 / +15 V, L_σ = 10 nH, inductive load	T_{vj} = 25 °C		15		mJ
			T_{vj} = 175 °C		24		mJ
Turn-off switching energy	E_{off}	V_{DD} = 400 V, I_D = 515 A, R_G = 1.5 Ω, C_G = 94 nF, V_{GS} = -4 / +15 V, L_σ = 10 nH, inductive load	T_{vj} = 25 °C		13		mJ
			T_{vj} = 175 °C		14		mJ

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[2] Based on chip capability
[3] Characteristic values according to IEC 60747 – 8
[4] R_{DSon} is given at chip level

Body diode characteristic values [5]

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Diode forward voltage [2] [6]	V_{SD}	I_S = 160 A, V_{GS} = -4 V	T_{vj} = 25 °C		4.6		V
			T_{vj} = 175 °C		4.2		V
Reverse recovery current	I_{rr}	V_R = 400 V, I_F = 515 A, V_{GS} = -4 / +15 V, R_G = 0.47 Ω, di/dt = 20 kA/µs L_σ = 10 nH inductive load	T_{vj} = 25 °C		100		A
			T_{vj} = 175 °C		170		A
Recovered charge	Q_{rr}		T_{vj} = 25 °C		11		µC
			T_{vj} = 175 °C		16		µC
Reverse recovery time	t_{rr}		T_{vj} = 25 °C		30		ns
			T_{vj} = 175 °C		55		ns
Reverse recovery energy	E_{rec}		T_{vj} = 25 °C		1		mJ
			T_{vj} = 175 °C		3		mJ

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[2] Based on chip capability
[5] Characteristic values according to IEC 60747 – 2
[6] Forward voltage is given at chip level

Package properties [7]

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
thermal resistance junction to fluid	$R_{th(j-f)}$	T_{in} = 55°C, Coolant: 50% glycol/ 50% water, per switch, 10 l/min, dP < 120 mbar water-glycol			114	120	K/kW
Comparative tracking index	CTI			400			V
Module stray inductance	$L_{\sigma\ DS}$				5		nH
Resistance, terminal-chip	$R_{DD'+SS'}$		T_C = 25 °C		0.117		mΩ
			T_C = 150 °C		0.227		mΩ

Mechanical properties [7]

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Dimensions	L	AC terminal to DC terminal			110		mm
	W	Mold width			69		mm
	H	Baseplate cooler surface to middle of PCB/pressfit			17.35		mm
Clearance distance in air	d_a	According to IEC 60664-1	Term. to base:		6.9		mm
			Term. to term:		3.3		mm
Surface creepage distance	d_s	According to IEC 60664-1	Term. to base:		8.5		mm
			Term. to term:		8		mm
Mass	m				300		g

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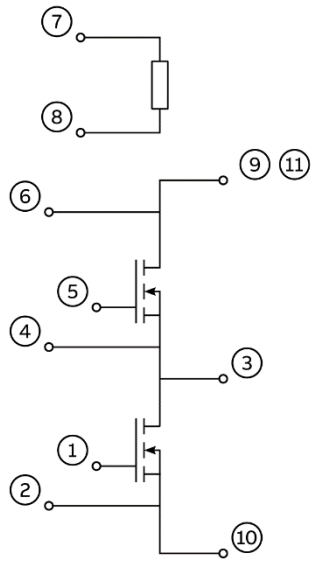
[7] Package and mechanical properties according to IEC 60747 – 15

Electrical configuration



1 → Gate LS
2 → Source LS
3 → AC
4 → Source HS
5 → Gate HS
6 → Drain HS
7,8 → T-sensor
9 → DC+
10 → DC-
11 → DC+

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