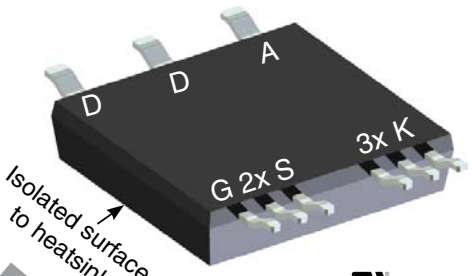
Buck / Boost Tpology

CoolMOS™ [1] with fast SONIC Diode

I_{D25} = 54 A
V_{DSS} = 600 V
$R_{DS(on)\ max}$ = 41 mΩ

ISOPLUS™ - electrically isolated surface to heatsink
Surface Mount Power Device

Part number
MKG40RK600LB



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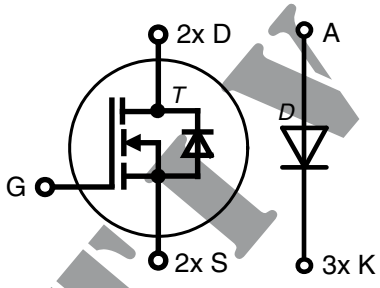


Features / Advantages:

- **Fast CoolMOS™ [1] C6 MOSFET**
  - very low on-resistance
  - low gate charge
  - avalanche rated for unclamped inductive switching (UIS)

Applications:

- Buck / boost chopper
- PFC stage
- Forward converter

Package: SMPD

- isolated surface to heatsink
- low coupling capacity between pins and heatsink
- PCB space saving
- enlarged creepage towards heatsink
- application friendly pinout
- low inductive current path
- high reliability

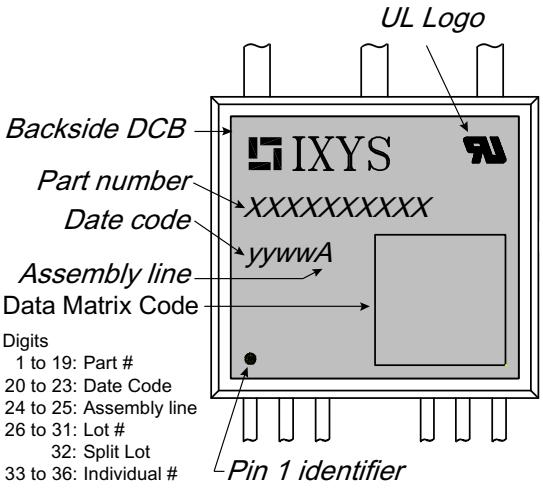
[1] CoolMOS™ is a trademark of Infineon Technologies AG.

MOSFET T				Ratings			
Symbol	Definitions	Conditions		min.	typ.	max.	
V_{DSS}	*drain source breakdown voltage*	up to	T_{VJ} = 150°C			600	V
V_{GS}	*gate source voltage*	continuous	T_{VJ} = 25°C			±20	V
		transient				±30	V
I_{D25}	*drain current*		T_C = 25°C			54	A
I_{D80}			T_C = 80°C			41	A
I_{D100}			T_C = 100°C			34	A
E_{AS}	*non-repetetive avalanche energy*	single pulse	T_{VJ} = 25°C			1.95	J
I_A						13.4	A
dV/dt	*rate of rise of voltage*	$I_S \geq I_{DM}$; $V_{DD} \leq 400$ V	T_{VJ} = 25°C			15	V/ns
R_{DSon}	*static drain source on resistance*	I_D = 44 A; V_{GS} = 10 V (Chip)	T_{VJ} = 25°C		37	41	mΩ
$V_{GS(th)}$	*gate threshold voltage*	I_D = 3 mA; $V_{DS} = V_{GS}$	T_{VJ} = 25°C	2.5	3	3.5	V
I_{DSS}	*drain source leakage current*	$V_{DS} = V_{DSS}$; V_{GS} = 0 V	T_{VJ} = 25°C			5	µA
			T_{VJ} = 150°C		50		µA
I_{GSS}	*gate source leakage current*	V_{DS} = 0 V; V_{GS} = ±20 V				±100	nA
C_{iss}	*input capacitance*	V_{GS} = 0 V; V_{DS} = 100 V; f = 1 MHz	T_{VJ} = 25°C		6.5		nF
C_{oss}	*output capacitance*		T_{VJ} = 125°C		360		pF
Q_g	*total gate charge*	V_{DS} = 480 V; I_D = 44 A	T_{VJ} = 25°C		290	190	nC
Q_{gs}	*gate source charge*	V_{GS} = 10 V; R_G = 1.6 Ω			36		nC
Q_{gd}	*gate drain (Miller) charge*				150		nC
$t_{d(on)}$	*turn-on delay time*	Inductive switching			tbd		ns
t_r	*current rise time*	boost mode with diode D			tbd		ns
$t_{d(off)}$	*turn-off delay time*	V_{DS} = 380 V; I_D = 44 A	T_{VJ} = 25°C		tbd		ns
t_f	*current fall time*	V_{GS} = 13 V; R_G = 1.6 Ω			tbd		ns
E_{on}	*turn-on energy per pulse*				tbd		mJ
E_{off}	*turn-off energy per pulse*				tbd		mJ
$E_{rec(off)}$	*reverse recovery losses at turn-off*				tbd		mJ
R_{thJC}	*thermal resistance junction to case*					0.4	K/W
R_{thJH}	*thermal resistance junction to heatsink*	with heatsink compound; IXYS test setup			0.6		K/W

Source-Drain Diode of MOSFET T				Ratings			
Symbol	Definitions	Conditions		min.	typ.	max.	
I_{S25}	*continuous source current*		T_C = 25°C			70	A
I_{S80}			T_C = 80°C			tbd	A
V_{SD}	*forward voltage drop*	I_F = 44 A; V_{GS} = 0 V	T_{VJ} = 25°C		0.9	1.1	V
t_{rr}	*reverse recovery time*	I_F = 44 A; V_R = 400 V	T_{VJ} = 25°C			950	ns
Q_{RM}	*reverse recovery charge (intrinsic diode)*	$-di_F/dt$ = 100 A/µs			32		µC
I_{RM}	*max. reverse recovery current*				62		A

Diode D				Ratings			
Symbol	Definitions	Conditions		min.	typ.	max.	
V_{RRM}	*max. repetitive reverse voltage*		T_{VJ} = 25°C			600	V
I_{F25}	*continuous source current*	DC	T_C = 25°C			65	A
I_{F80}		DC	T_C = 80°C			45	A
V_F	*forward voltage*	I_F = 44 A (Chip)	T_{VJ} = 25°C		1.70	2.0	V
			T_{VJ} = 125°C		1.65		V
I_R	*reverse current*	$V_R = V_{RRM}$	T_{VJ} = 25°C			100	µA
			T_{VJ} = 125°C			8	mA
I_{RM}	*max. reverse recovery current*	I_F = 30 A; V_R = 350 V	T_{VJ} = 100°C		tbd		A
		-di/dt = 240 A/µs					
t_{rr}	*reverse recovery time*	I_F = 1 A; V_R = 30 V; -di/dt = 100 A/µs	T_{VJ} = 100°C		tbd		ns
R_{thJC}	*thermal resistance junction to case*					0.6	K/W
R_{thJH}	*thermal resistance junction to heatsink*	with heatsink compound; IXYS test setup			0.85		K/W

Package SMPD			Ratings			
Symbol	**Definitions**	**Conditions**	**min.**	**typ.**	**max.**	
T_{stg}	*storage temperature*		-55		125	°C
T_{VJ}	*virtual junction temperature*		-55		150	°C
Weight				8		g
F_C	*mounting force with clip*		40		130	N
$d_{Spp/App}$	*creepage distance on surface /*	terminal to terminal	1.65			mm
$d_{Spb/Apb}$	*striking distance through air*	terminal to backside	4.0			mm
V_{ISOL}	*isolation voltage*	t = 1 second t = 1 minute 50/60 Hz; RMS; I_{ISOL} < 1 mA		3000 2500		V V
C_P	*coupling capacity*	between shorted terminals and backside metal		90		pF
CTI			400			
$R_{pin-chip}$	*resistance pin to chip*	$V = (R_{DSon} + 2 \cdot R) \cdot I_D$ resp. $V = V_F + 2 \cdot R \cdot I_F$		1		mΩ

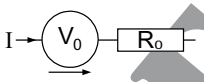


Part number

M = MOSFET
K = CoolMOS™ [1)]
G = C6
40 = Current Rating [A]
RK = Boost/Brake Chopper
600 = Reverse Voltage [V]
LB = SMPD-B

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MKG40RK600LB-TRR	MKG40RK600LB	Tape&Reel	200	514630

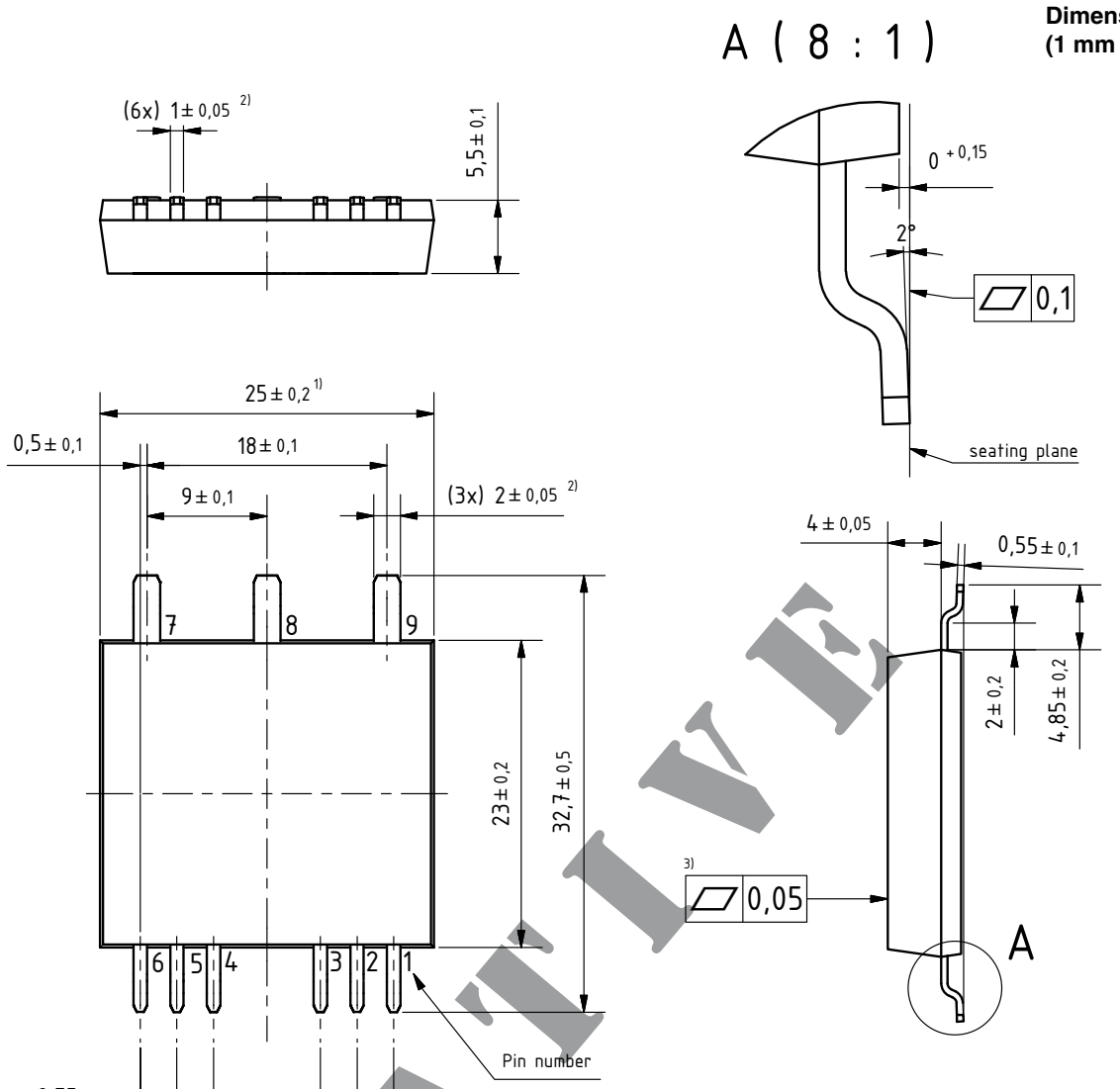
Equivalent Circuits for Simulation **on die level*



$V_{0\ max}$	*threshold voltage*	V
$R_{0\ max}$	*slope resistance **	mΩ

Outlines SMPD

Dimensions in mm (1 mm = 0.0394“)



Notes:
1) potrusion may add 0.2 mm max. on each side
2) additional max. 0.05 mm per side by punching misalignement or overlap of dam bar or bending compression
3) DCB area 10 to 50 µm convex;
position of DCB area in relation to plastic rim: ±25 µm
(measured 2 mm from Cu rim)
4) terminal plating: 0.2 - 1 µm Ni + 10 - 25 µm Sn (galv.)
cutting edges may be partially free of plating