

Buck / Boost Topology

CoolMOS™¹⁾ with fast SONIC Diode

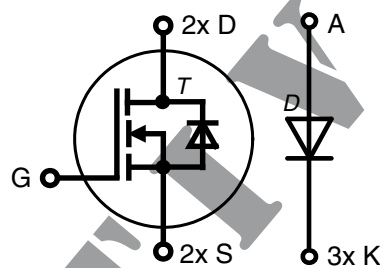
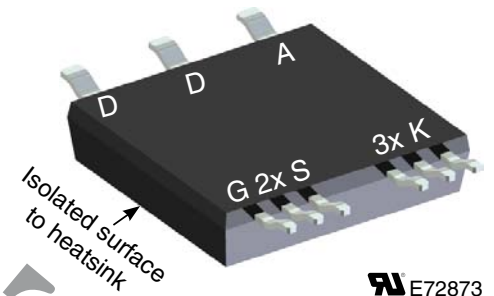
$$I_{D25} = 54 \text{ A}$$

$$V_{DSS} = 600 \text{ V}$$

$$R_{DS(on) \text{ max}} = 41 \text{ m}\Omega$$

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

Part number
 MKG40RK600LB



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

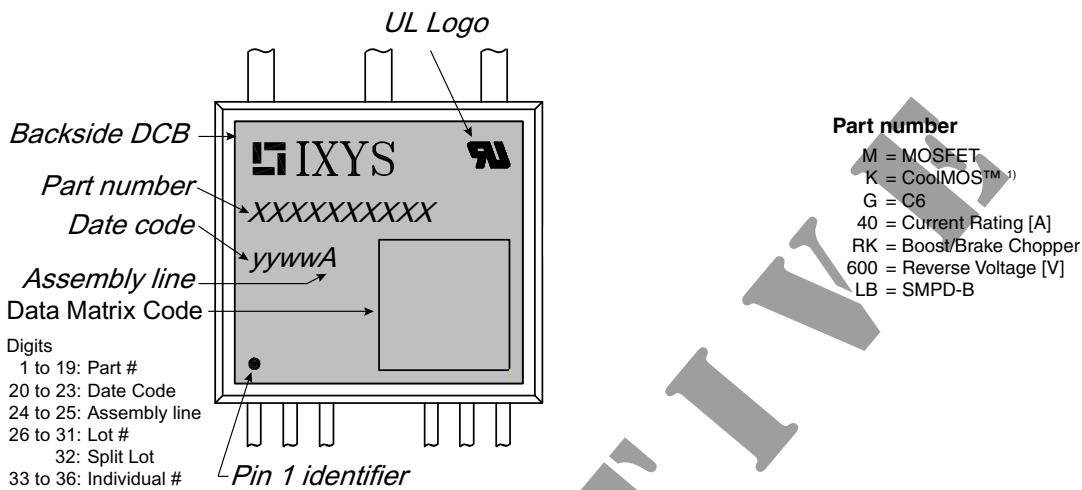
¹⁾ CoolMOS™ is a trademark of Infineon Technologies AG.

MOSFET T				Ratings			
Symbol	Definitions	Conditions	min.	typ.	max.		
V_{DSS}	drain source breakdown voltage	up to $T_{VJ} = 150^{\circ}\text{C}$			600	V	
V_{GS}	gate source voltage	continuous transient			± 20 ± 30	V V	
I_{D25}	drain current	$T_C = 25^{\circ}\text{C}$			54	A	
I_{D80}		$T_C = 80^{\circ}\text{C}$			41	A	
I_{D100}		$T_C = 100^{\circ}\text{C}$			34	A	
E_{AS}	non-repetitive avalanche energy	single pulse			1.95	J	
I_A					13.4	A	
dV/dt	rate of rise of voltage	$I_S \geq I_{DM}; V_{DD} \leq 400\text{ V}$			15	V/ns	
R_{DSon}	static drain source on resistance	$I_D = 44\text{ A}; V_{GS} = 10\text{ V}$ (Chip)		37	41	m Ω	
$V_{GS(th)}$	gate threshold voltage	$I_D = 3\text{ mA}; V_{DS} = V_{GS}$	2.5	3	3.5	V	
I_{DSS}	drain source leakage current	$V_{DS} = V_{DSS}; V_{GS} = 0\text{ V}$			5	μA	
			$T_{VJ} = 150^{\circ}\text{C}$		50	μA	
I_{GSS}	gate source leakage current	$V_{DS} = 0\text{ V}; V_{GS} = \pm 20\text{ V}$			± 100	nA	
C_{iss}	input capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 100\text{ V}; f = 1\text{ MHz}$		6.5		nF	
C_{oss}	output capacitance		$T_{VJ} = 125^{\circ}\text{C}$		360		pF
Q_g	total gate charge	$V_{DS} = 480\text{ V}; I_D = 44\text{ A}$ $V_{GS} = 10\text{ V}; R_G = 1.6\ \Omega$		290	190	nC	
Q_{gs}	gate source charge		$T_{VJ} = 25^{\circ}\text{C}$		36	nC	
Q_{gd}	gate drain (Miller) charge				150	nC	
$t_{d(on)}$	turn-on delay time	Inductive switching boost mode with diode D $V_{DS} = 380\text{ V}; I_D = 44\text{ A}$ $V_{GS} = 13\text{ V}; R_G = 1.6\ \Omega$		tdb		ns	
t_r	current rise time		$T_{VJ} = 25^{\circ}\text{C}$		tdb		ns
$t_{d(off)}$	turn-off delay time				tdb		ns
t_f	current fall time				tdb		ns
E_{on}	turn-on energy per pulse				tdb		mJ
E_{off}	turn-off energy per pulse				tdb		mJ
$E_{rec(off)}$	reverse recovery losses at turn-off			tdb		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	$T_C = 25^{\circ}\text{C}$			70	A	
I_{S80}		$T_C = 80^{\circ}\text{C}$			tdb	A	
V_{SD}	forward voltage drop	$I_F = 44\text{ A}; V_{GS} = 0\text{ V}$		0.9	1.1	V	
t_{rr}	reverse recovery time	$I_F = 44\text{ A}; V_R = 400\text{ V}$ $-di_F/dt = 100\text{ A}/\mu\text{s}$			950	ns	
Q_{RM}	reverse recovery charge (intrinsic diode)		$T_{VJ} = 25^{\circ}\text{C}$		32		μC
I_{RM}	max. reverse recovery current				62		A

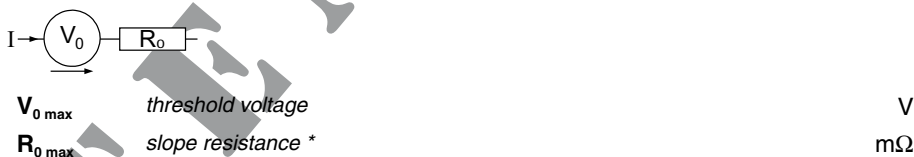
Diode D				Ratings		
Symbol	Definitions	Conditions	min.	typ.	max.	
V_{RRM}	max. repetitive reverse voltage	$T_{VJ} = 25^{\circ}\text{C}$			600	V
I_{F25}	continuous source current	DC			65	A
I_{F80}		DC			45	A
V_F	forward voltage	$I_F = 44\text{ A}$ (Chip)		1.70 1.65	2.0	V V
I_R	reverse current	$V_R = V_{RRM}$			100 8	μA mA
I_{RM}	max. reverse recovery current	$I_F = 30\text{ A}; V_R = 350\text{ V}$ $-di/dt = 240\text{ A}/\mu\text{s}$		tdb		A
t_{rr}	reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; -di/dt = 100\text{ A}/\mu\text{s}$		tdb		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		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



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

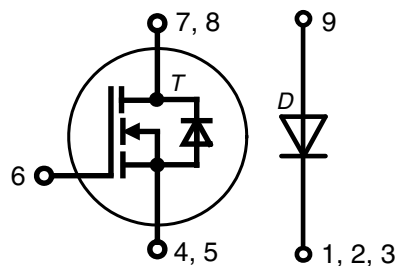
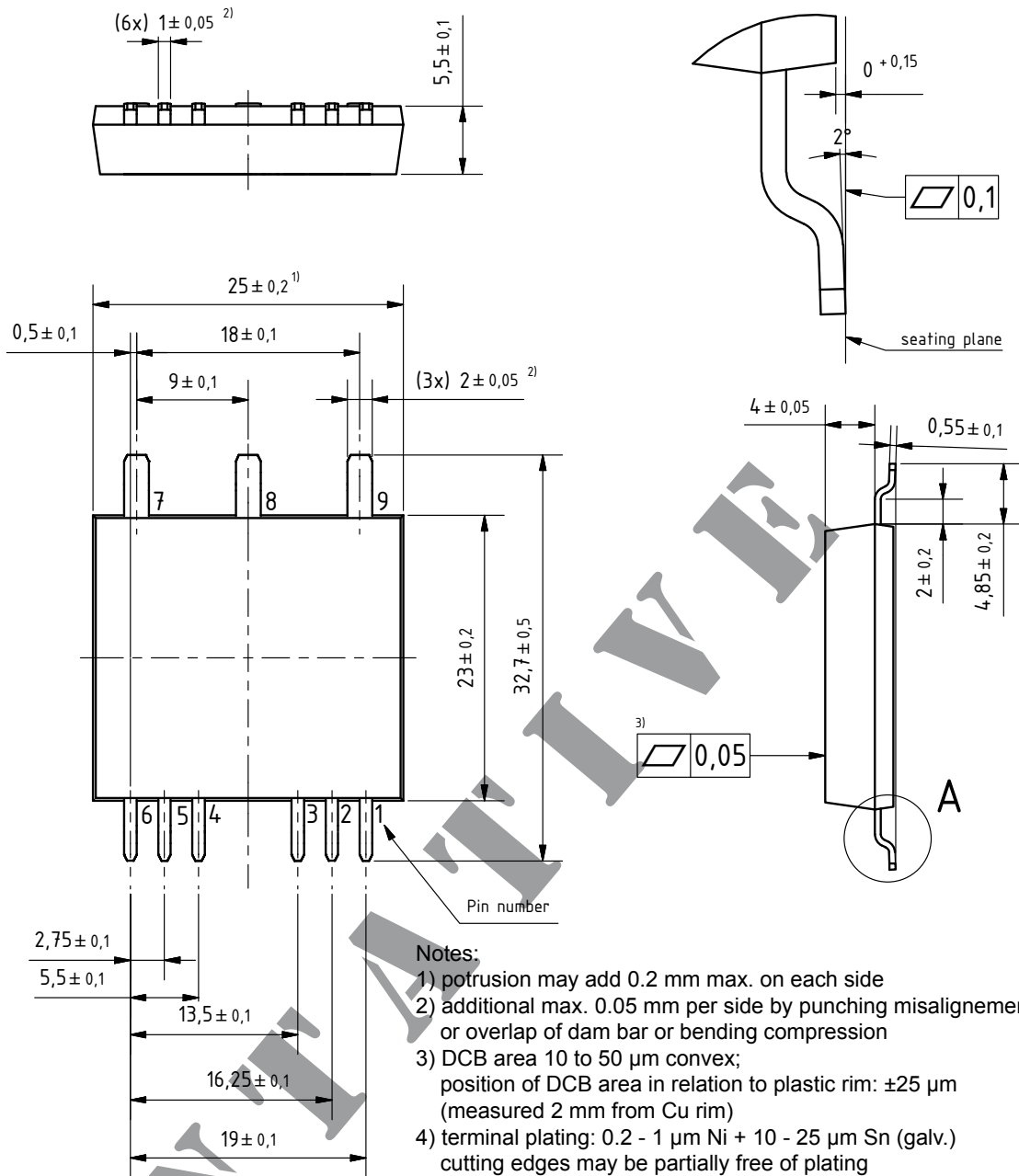
Equivalent Circuits for Simulation *on die level



Outlines SMPD

Dimensions in mm
(1 mm = 0.0394")

A (8 : 1)





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