

Buck / Boost Topology

CoolMOS™¹⁾ with fast SONIC Diode

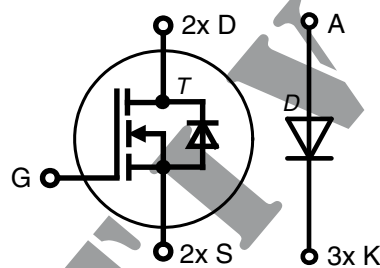
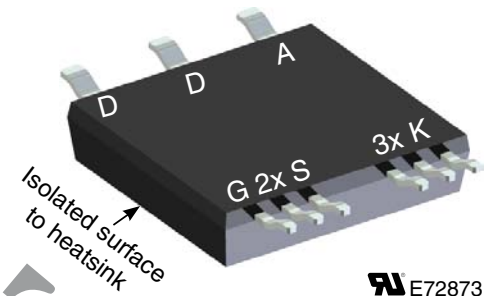
$$I_{D25} = 54 \text{ A}$$

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

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

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

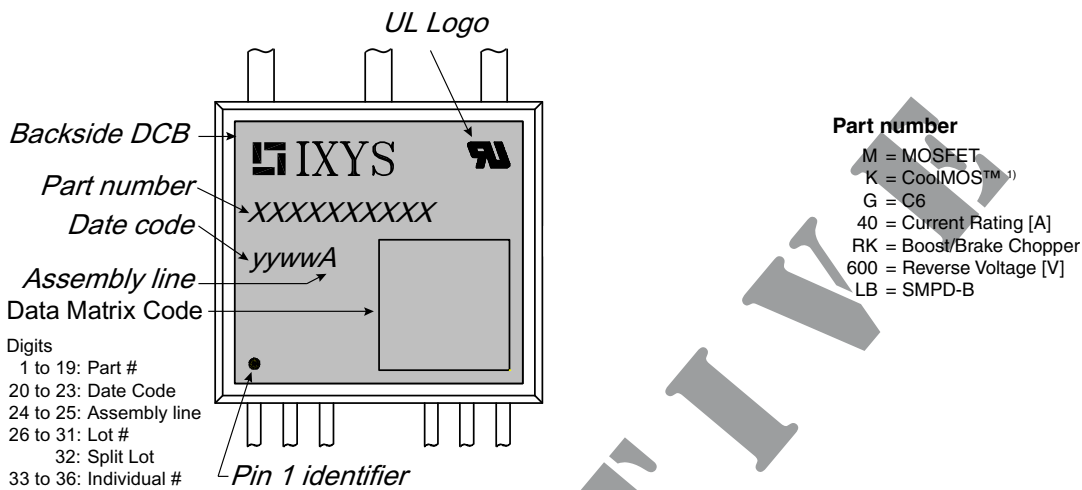
¹⁾ CoolMOS™ is a trademark of Infineon Technologies AG.

MOSFET T				Ratings			
Symbol	Definitions	Conditions	min.	typ.	max.		
V_{DSS}	drain source breakdown voltage	up to $T_{VJ} = 150^{\circ}C$			600	V	
V_{GS}	gate source voltage	continuous transient			± 20 ± 30	V V	
I_{D25}	drain current	$T_C = 25^{\circ}C$			54	A	
I_{D80}		$T_C = 80^{\circ}C$			41	A	
I_{D100}		$T_C = 100^{\circ}C$			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	$I_S \geq I_{DM}; V_{DD} \leq 400 V$			15	V/ns	
R_{DSon}	static drain source on resistance	$I_D = 44 A; V_{GS} = 10 V$ (Chip)			37	41	m Ω
$V_{GS(th)}$	gate threshold voltage	$I_D = 3 mA; V_{DS} = V_{GS}$			2.5	3	3.5 V
I_{DSS}	drain source leakage current	$V_{DS} = V_{DSS}; V_{GS} = 0 V$					5 μA
			$T_{VJ} = 25^{\circ}C$ $T_{VJ} = 150^{\circ}C$				50 μA
I_{GSS}	gate source leakage current	$V_{DS} = 0 V; V_{GS} = \pm 20 V$				± 100	nA
C_{iss}	input capacitance	$V_{GS} = 0 V; V_{DS} = 100 V; f = 1 MHz$				6.5	nF
C_{oss}	output capacitance		$T_{VJ} = 25^{\circ}C$ $T_{VJ} = 125^{\circ}C$			360	pF
Q_g	total gate charge	$V_{DS} = 480 V; I_D = 44 A$ $V_{GS} = 10 V; R_G = 1.6 \Omega$				290	190 nC
Q_{gs}	gate source charge		$T_{VJ} = 25^{\circ}C$			36	nC
Q_{gd}	gate drain (Miller) charge					150	nC
$t_{d(on)}$	turn-on delay time	Inductive switching boost mode with diode D $V_{DS} = 380 V; I_D = 44 A$ $V_{GS} = 13 V; R_G = 1.6 \Omega$				tdb	ns
t_r	current rise time		$T_{VJ} = 25^{\circ}C$			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	$T_C = 25^{\circ}C$			70	A	
I_{S80}		$T_C = 80^{\circ}C$			tdb	A	
V_{SD}	forward voltage drop	$I_F = 44 A; V_{GS} = 0 V$			0.9	1.1	V
t_{rr}	reverse recovery time	$I_F = 44 A; V_R = 400 V$ $-di_F/dt = 100 A/\mu s$					950 ns
Q_{RM}	reverse recovery charge (intrinsic diode)		$T_{VJ} = 25^{\circ}C$			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	$T_{VJ} = 25^{\circ}C$			600	V	
I_{F25}	continuous source current	DC			65	A	
I_{F80}		DC			45	A	
V_F	forward voltage	$I_F = 44 A$ (Chip)			1.70	2.0	V
					1.65		V
I_R	reverse current	$V_R = V_{RRM}$			100	8	μA mA
I_{RM}	max. reverse recovery current	$I_F = 30 A; V_R = 350 V$ $-di/dt = 240 A/\mu s$			tdb		A
t_{rr}	reverse recovery time	$I_F = 1 A; V_R = 30 V; -di/dt = 100 A/\mu s$			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

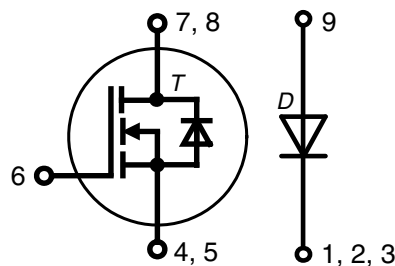
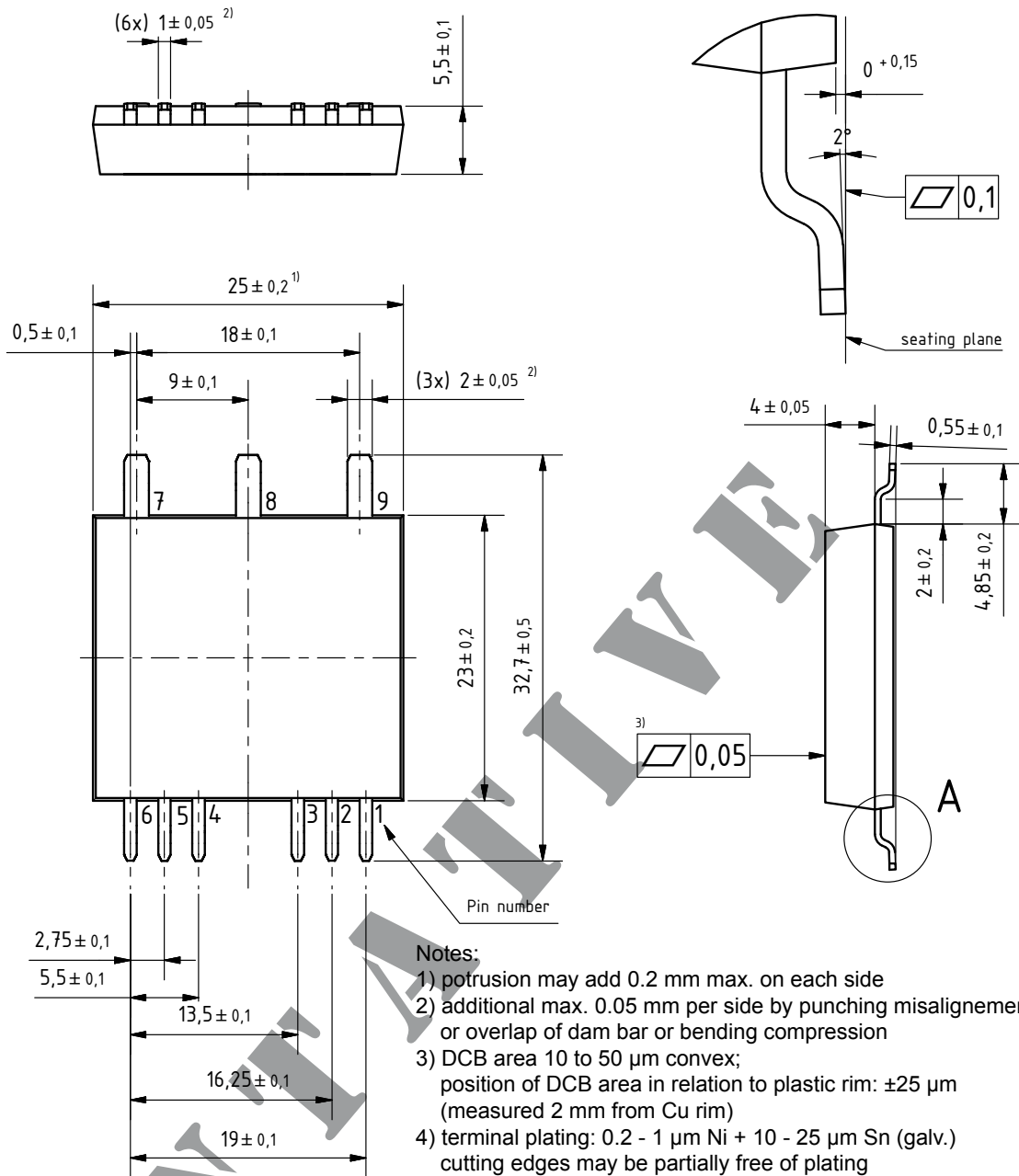
Equivalent Circuits for Simulation *on die level



Outlines SMPD

Dimensions in mm
(1 mm = 0.0394")

A (8 : 1)





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