

## Buck / Boost Topology

### CoolMOS™<sup>1)</sup> with fast SONIC Diode

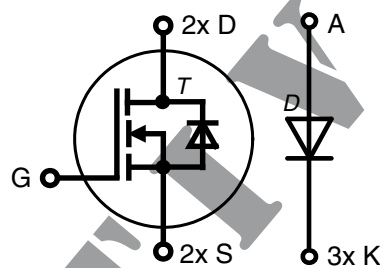
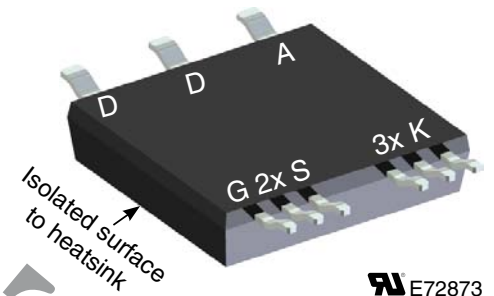
$$I_{D25} = 54 \text{ A}$$

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

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

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

**Part number**  
 MKG40RK600LB



#### Features / Advantages:

- **Fast CoolMOS™<sup>1)</sup> 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

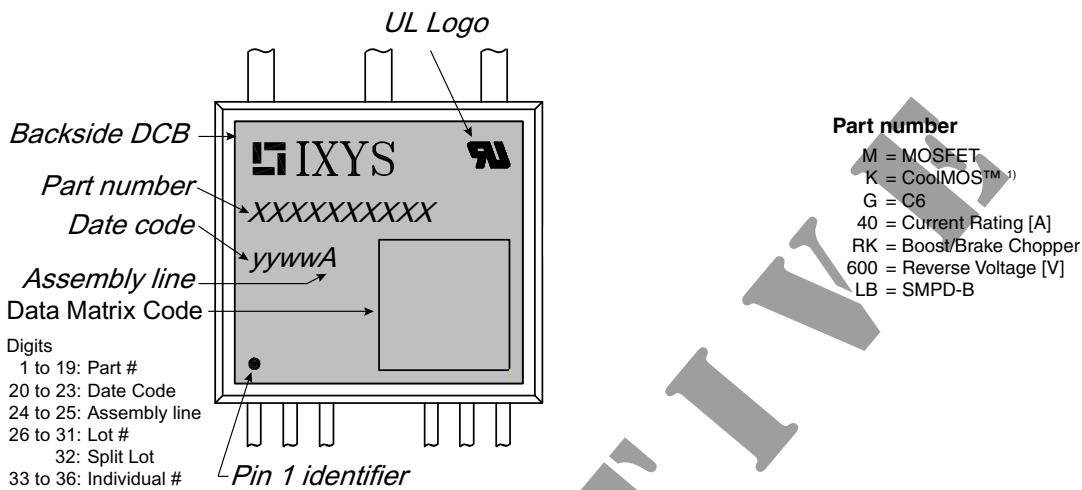
<sup>1)</sup> CoolMOS™ is a trademark of Infineon Technologies AG.

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			$\pm 20$ $\pm 30$	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 $\Omega$
$V_{GS(th)}$	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 $\mu A$
			$T_{VJ} = 25^{\circ}C$ $T_{VJ} = 150^{\circ}C$				50 $\mu A$
$I_{GSS}$	gate source leakage current	$V_{DS} = 0 V; V_{GS} = \pm 20 V$				$\pm 100$	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	$\mu C$
$I_{RM}$	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	$\mu A$
						8	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	
<b>Weight</b>				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	
<b>CTI</b>			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

A ( 8 : 1 )

Dimensions in mm  
(1 mm = 0.0394")

