

Buck / Boost Topology

CoolMOS™¹⁾ with fast SONIC Diode

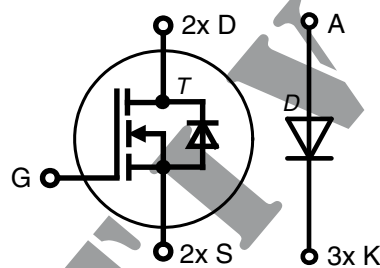
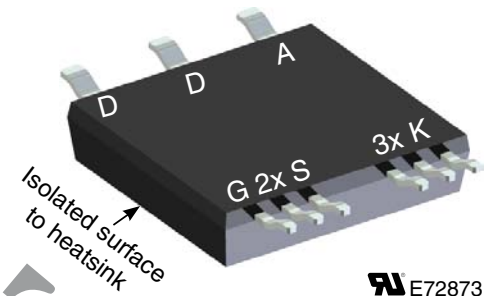
$$I_{D25} = 54 \text{ A}$$

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

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

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

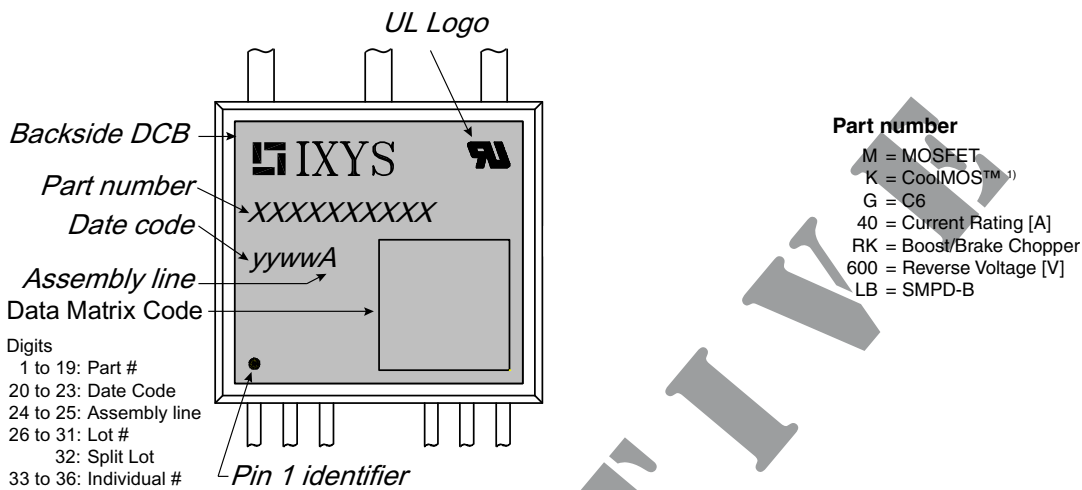
¹⁾ CoolMOS™ is a trademark of Infineon Technologies AG.

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	

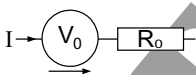
Source-Drain Diode of MOSFET T				Ratings			
Symbol	Definitions	Conditions	min.	typ.	max.		
I_{S25}	continuous source current	$T_C = 25^{\circ}C$			70	A	
I_{S80}		$T_C = 80^{\circ}C$			tdb	A	
V_{SD}	forward voltage drop	$I_F = 44 A; V_{GS} = 0 V$		0.9	1.1	V	
t_{rr}	reverse recovery time	$I_F = 44 A; V_R = 400 V$ $-di/dt = 100 A/\mu s$			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 $T_C = 25^{\circ}C$			65	A
I_{F80}		DC $T_C = 80^{\circ}C$			45	A
V_F	forward voltage	$I_F = 44 A$ (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	$I_F = 30 A; V_R = 350 V$ $-di/dt = 240 A/\mu s$		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

 $V_{0\ max}$ threshold voltage

V

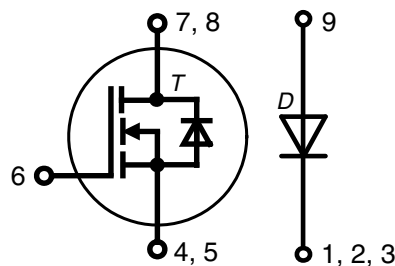
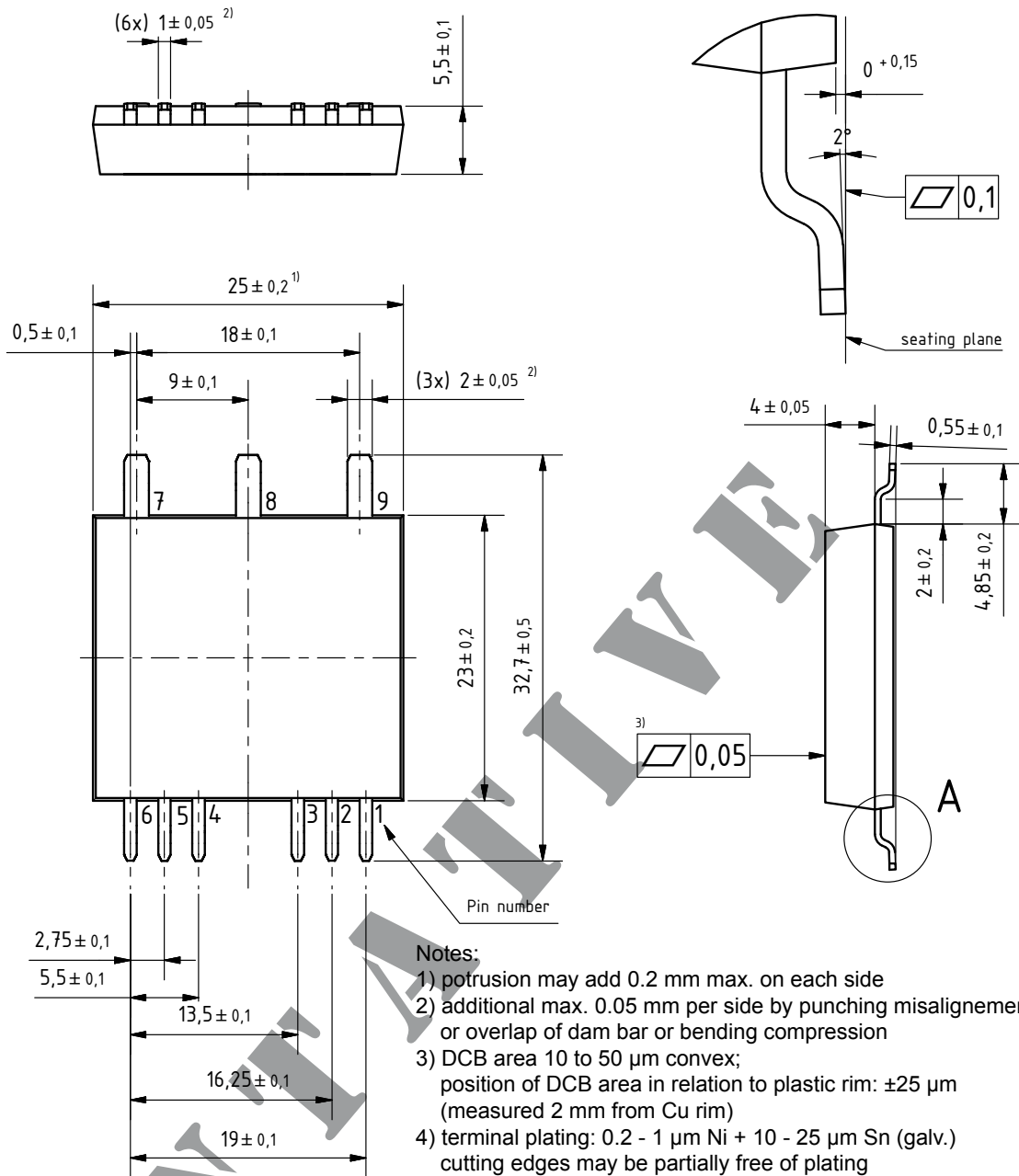
 $R_{0\ max}$ slope resistance *

mΩ

Outlines SMPD

Dimensions in mm
(1 mm = 0.0394")

A (8 : 1)





Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.