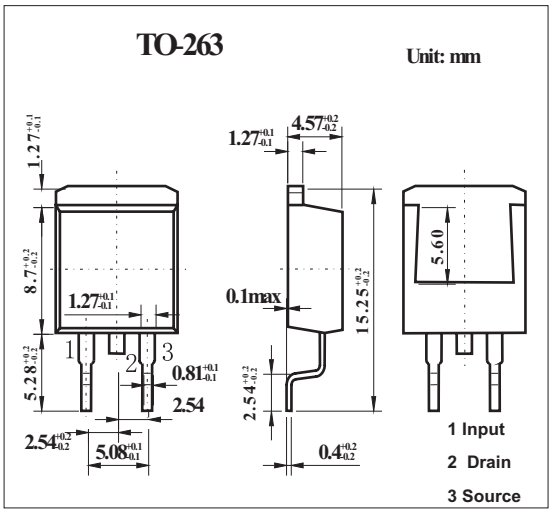
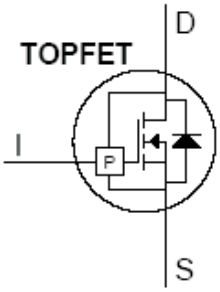
PowerMOS transistor Logic level TOPFET
KUK109-50DL

■ Features

- ●Vertical power DMOS output stage
- ●Low on-state resistance
- ●Overload protection against over temperature
- ●Overload protection against short circuit load
- ●Latched overload protectionreset by input
- ●5 V logic compatible input level
- ●Control of power MOSFET and supply of overload protection circuits derived from input
- ●Lower operating input current permits direct drive by micro-controller
- ●ESD protection on input pin
- ●Overvoltage clamping for turn off of inductive loads





■ Absolute Maximum Ratings Ta = 25℃

Parameter	Symbol	Rating	Unit
Continuous drain source voltage*2	V_{DS}	50	V
Continuous input voltage	V_{IS}	0 to 6	V
Continuous drain current *1	I_D	26	A
Continuous drain current T_{mb} ≤ 100℃; V_{IS} = 5 V	I_D	16	A
Repetitive peak on-state drain current *1	I_{DRM}	100	A
Total power dissipation	P_D	75	W
Storage temperature	T_{stg}	-55 to 150	℃
Continuous junction temperature*3	T_j	150	℃
Lead temperature	T_{sold}	250	℃
Protection supply voltage*4	V_{ISP}	4	V
Protected drain source supply voltage V_{IS} = 5 V	$V_{DDP(T)}$	50	V
Protected drain source supply voltage V_{IS} = 5 V	$V_{DDP(P)}$	20	V

KUK109-50DL

■ Absolute Maximum Ratings Ta = 25℃

Parameter	Symbol	Rating	Unit
Instantaneous overload dissipation T_{mb} = 25℃	P_{DSM}	1.3	kW

* 1T_{mb} ≤ 25 ℃; V_{IS} = 5 V

*2 Prior to the onset of overvoltage clamping. For voltages above this value, safe operation is limited by the overvoltage clamping energy.

*3 A higher T_j is allowed as an overload condition but at the threshold $T_{j(TO)}$ the over temperature trip operates to protect the switch.

*4 The input voltage for which the overload protection circuits are functional.

■ Electrical Characteristics Ta = 25℃

Parameter	Symbol	Testconditons	Min	Typ	Max	Unit
Repetitive peak clamping current	I_{DROM}	V_{IS} = 0 V			26	A
Non-repetitive clamping energy	E_{DSM}	T_{mb} ≤ 25℃; I_{DM} = 26 A;V ≤ 20 V;			625	mJ
Repetitive clamping energy	E_{DRM}	T_{mb}≤ 95℃; I_{DM} = 8 A;V_{DD} ≤ 20 V; f = 250 Hz			40	mJ
Electrostatic discharge capacitor voltage	V_C	Human body model;C = 250 pF; R = 1.5 kΩ			2	kV
Drain-source clamping voltage	$V_{(CL)DSS}$	V_{IS} = 0 V; I_D = 10 mA	50			V
Drain-source clamping voltage	$V_{(CL)DSS}$	V_{IS} = 0 V; I_{DM} = 2 A; t_p ≤ 300 μs;d ≤ 0.01			70	V
Zero input voltage drain current	I_{DSS}	V_{DS} = 12 V; V_{IS} = 0 V		0.5	10	mA
Zero input voltage drain current	I_{DSS}	V_{DS} = 50 V; V_{IS} = 0 V		1	20	mA
Zero input voltage drain current	I_{DSS}	V_{DS} = 40 V; V_{IS} = 0 V; T_j = 125℃		10	100	mA
Drain-source on-state resistance*1	$R_{DS(ON)}$	V_{IS} = 5 V; I_{DM} = 13 A; t_p ≤ 300 μs;d ≤ 0.01		45	60	mW
Overload threshold energy	$E_{DS(TO)}$	T_{mb}=25℃;L≤10mH;R_L=10mΩ;V_{DD}=13V;V_{IS}=5V		0.4		J
Response time	$t_{d\ sc}$	T_{mb}=25℃;L≤10mH;R_L=10mΩ;V_{DD}=13V;V_{IS}=5V		0.8		ms
Drain current*2	$I_{D(SC)}$	T_{mb}=25℃;L≤10mH;R_L=10mΩ;V_{DD}=13V; V_{IS}=5V		45		A
Peak drain current*3	$I_{DM(SC)}$	T_{mb}=25℃;L≤10mH;R_L=10mΩ;V_{IS}=5V;V_{DD}=13V		105		A
Threshold junction temperature	$T_{j(TO)}$	V_{IS} = 5 V; from I_D ≥ 1 A	150			℃
Forward transconductance	g_{fs}	V_{DS} = 10 V; I_{DM} = 13 A t_p≤ 300 μs;d ≤ 0.01	10	16		S
Input threshold voltage	$V_{IS(TO)}$	V_{DS} = 5 V; I_D = 1 mA	1.0	1.5	2.0	V
Input supply current	I_{IS}	normal operation; V_{IS} = 5 V	100	200	350	mA
		V_{IS} = 4 V		160	270	mA
Protection reset voltage*1	V_{ISR}	T_j = 25℃	2.0	2.6	3.5	V
		T = 150℃	1.0			
Input supply current	I_{ISL}	protection latched; V_{IS} = 5 V		330	650	mA
		V_{IS} = 3.5 V		240	430	mA
Input breakdown voltage	$V_{(BR)IS}$	I_I = 10 mA	6			V
Input series resistance to gate of power MOSFET	R_{IG}	T_j = 25℃		33		kΩ
		T_j = 150℃		50		kΩ
Turn-on delay time	$t_{d\ on}$	V_{DD} = 13 V; V_{IS} = 5 V		17		μs
Rise time	t_r	resistive loadg R_L = 2.1Ω		75		μs
Turn-off delay time	$t_{d\ off}$	V_{DD} = 13 V; V_{IS} = 0 V		60		μs
Fall time	t_f	resistive load R_L = 2.1Ω		70		μs

KUK109-50DL

■ Electrical Characteristics Ta = 25℃

Parameter	Symbol	Testconditons	Min	Typ	Max	Unit
Continuous forward current	I_S	$T_{mb} \leqslant 25℃$; V_{IS} = 0 V			26	A
Forward voltage	V_{SDO}	I_S = 26 A; V_{IS} = 0 V; t_p = 300 μs		1.0	1.5	V
Reverse recovery time	t_{rr}	not applicable				
Internal drain inductance	L_d	Measured from upper edge of tab to centre of die		2.5		nH
Internal source inductance	L_s	Measured from source lead soldering point to source bond pad		7.5		nH

*1 Continuous input voltage. The specified pulse width is for the drain current.

*2 Continuous drain-source supply voltage. Pulsed input voltage.

*3 Continuous input voltage. Momentary short circuit load connection.