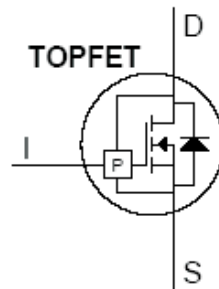
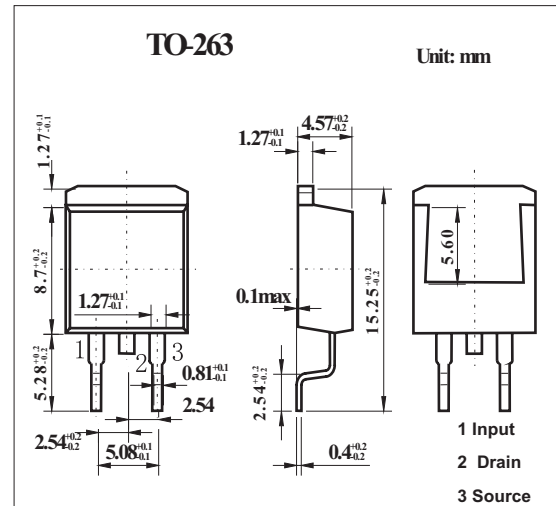


PowerMOS transistor Logic level TOPFET KUK109-50DL

■ Features

- Vertical power DMOS output stage
- Low on-state resistance
- Overload protection against over temperature
- Overload protection against short circuit load
- Latched overload protection reset 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 $T_a = 25^\circ\text{C}$

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 $T_{mb} \leq 100^\circ\text{C}$; $V_{IS} = 5\text{ V}$	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	$^\circ\text{C}$
Continuous junction temperature*3	T_j	150	$^\circ\text{C}$
Lead temperature	T_{sold}	250	$^\circ\text{C}$
Protection supply voltage*4	V_{ISP}	4	V
Protected drain source supply voltage $V_{IS} = 5\text{ V}$	$V_{DDP(T)}$	50	V
Protected drain source supply voltage $V_{IS} = 5\text{ V}$	$V_{DDP(P)}$	20	V

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■ Absolute Maximum Ratings $T_a = 25^\circ\text{C}$

Parameter	Symbol	Rating	Unit
Instantaneous overload dissipation $T_{mb} = 25^\circ\text{C}$	P_{DSM}	1.3	kW

*1 $T_{mb} \leq 25^\circ\text{C}$; $V_{IS} = 5\text{ V}$

*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 $T_a = 25^\circ\text{C}$

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

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■ Electrical Characteristics Ta = 25°C

Parameter	Symbol	Testconditons	Min	Typ	Max	Unit
Continuous forward current	I _s	T _{mb} ≤ 25°C; 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.