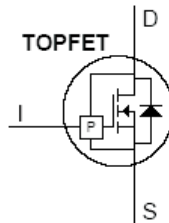
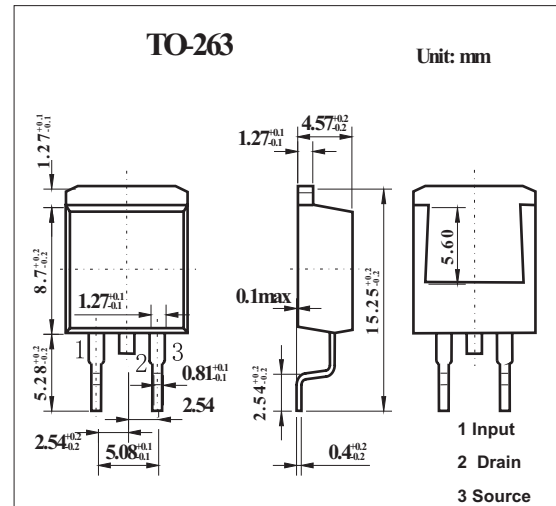


PowerMOS transistor Logic level TOPFET

KUK108-50DL

■ 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	Condition	Rating	Unit
Continuous drain source voltage*1	V_{DS}		50	V
Continuous input voltage	V_{IS}		6	V
Continuous drain current	I_D	$T_{mb} \leq 25^\circ\text{C}; V_{IS} = 5\text{ V}$	13.5	A
Continuous drain current	I_D	$T_{mb} \leq 100^\circ\text{C}; V_{IS} = 5\text{ V}$	8.5	A
Repetitive peak on-state drain current	I_{DRM}	$T_{mb} \leq 25^\circ\text{C}; V_{IS} = 5\text{ V}$	54	A
Total power dissipation	P_D	$T_{mb} \leq 25^\circ\text{C}$	40	W
Storage temperature	T_{stg}		-55 to +150	$^\circ\text{C}$
Continuous junction temperature*2	T_j		150	$^\circ\text{C}$
Lead temperature	T_{sold}		250	$^\circ\text{C}$
Protection supply voltage*3	V_{ISP}		4	V
Protected drain source supply voltage	$V_{DDP(T)}$	$V_{IS} = 5\text{ V}$	50	V
Protected drain source supply voltage*4	$V_{DDP(P)}$	$V_{IS} = 5\text{ V}$	24	V
Instantaneous overload dissipation	P_{DSM}	$T_{mb} = 25^\circ\text{C}$	0.6	kW
Repetitive peak clamping current	I_{DROM}	$V_{IS} = 0\text{ V}$	15	A
Non-repetitive clamping energy	E_{DSM}	$T_{mb} \leq 25^\circ\text{C}; I_{DM} = 15\text{ A}; V_{DD} \leq 20\text{ V};$	200	mJ
Repetitive clamping energy	E_{DRM}	$T_{mb} \leq 95^\circ\text{C}; I_{DM} = 8\text{ A}; V_{DD} \leq 20\text{ V}; f = 250\text{ Hz}$	20	mJ
Electrostatic discharge capacitor voltage	V_C	$C = 250\text{ pF}; R = 1.5\text{ k}\Omega$	2	kV

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

Parameter	Symbol	Condition	Rating	Unit
Junction to mounting base	$R_{th\ j-mb}$		2.5 to 3.1	K/W
Junction to ambient	$R_{th\ j-a}$		50	K/W
Continuous forward current	I_s	$T_{mb} \leq 25^\circ\text{C}; V_{is} = 0\text{ V}$	15	A

*1Prior to the onset of overvoltage clamping. For voltages above this value, safe operation is limited by the overvoltage clamping energy.

*2A 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

*3The input voltage for which the overload protection circuits are functional.

*4The short circuit load protection is able to save the device providing the instantaneous on-state dissipation is less than the limiting value for PDSM, which is always the case when V_{DS} is less than $V_{DDP(P)}$ maximum.

■ Electrical Characteristics $T_a = 25^\circ\text{C}$

Parameter	Symbol	Testconditons	Min	Typ	Max	Unit
Drain-source clamping voltage	$V_{(CL)DSS}$	$V_{is} = 0\text{ V}; I_D = 10\text{ mA}$	50			V
Drain-source clamping voltage	$V_{(CL)DSS}$	$V_{is} = 0\text{ V}; I_{DM} = 1\text{ A}; t_p \leq 300\text{ ms}; d \leq 0.01$			70	V
Zero input voltage drain current	I_{DSS}	$V_{DS} = 12\text{ V}; V_{is} = 0\text{ V}$		0.5	10	μA
Zero input voltage drain current	I_{DSS}	$V_{DS} = 50\text{ V}; V_{is} = 0\text{ V}$		1	20	μA
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	μA
Drain-source on-state resistance*1	$R_{DS(ON)}$	$V_{is} = 5\text{ V}; I_{DM} = 7.5\text{ A}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.01$		85	125	$\text{m}\Omega$
Overload threshold energy	$E_{DS(TO)}$	$V_{DD} = 13\text{ V}; V_{is} = 5\text{ V}; L \leq 10\text{ }\mu\text{H}; R_L = 10\text{ m}\Omega$		0.2		J
Response time	$t_{d\ sc}$	$V_{DD} = 13\text{ V}; V_{is} = 5\text{ V}; L \leq 10\text{ }\mu\text{H}; R_L = 10\text{ m}\Omega$		0.8		ms
Drain current*2	$I_{D(SC)}$	$V_{DD} = 13\text{ V}; V_{is} = 5\text{ V}; L \leq 10\text{ }\mu\text{H}; R_L = 10\text{ m}\Omega$		25		A
Peak drain current*3	$I_{DM(SC)}$	$V_{is} = 5\text{ V}; V_{DD} = 13\text{ V}; L \leq 10\text{ }\mu\text{H}; R_L = 10\text{ m}\Omega$		60		A
Threshold junction temperature	$T_j(TO)$	$V_{is} = 5\text{ V}; \text{ from } I_D \geq 0.5\text{ A}^*4$	150			$^\circ\text{C}$
Forward transconductance	g_{fs}	$V_{DS} = 10\text{ V}; I_{DM} = 7.5\text{ A}; t_p \leq 300\text{ ms}; d \leq 0.01$	5	9		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}	$V_{is} = 5\text{ V}$	100	200	350	μA
		$V = 4\text{ V}$		160	270	μA
Protection reset voltage*5	V_{ISR}	$T_j = 25^\circ\text{C}$	2.0	2.6	3.5	V
		$T = 150^\circ\text{C}$	1.0			
Input supply current	I_{isL}	$V_{is} = 3.5\text{ V}$		330	650	μA
		$V_{is} = 5\text{ V}$		240	430	μA
Input breakdown voltage	$V_{(BR)is}$	$I_i = 10\text{ mA}$	6			V
Input series resistance	R_{iG}	$T_j = 25^\circ\text{C}$		33		$\text{k}\Omega$
to gate of power MOSFET		$T_j = 150^\circ\text{C}$		50		$\text{k}\Omega$
Turn-on delay time	$t_{d\ on}$	$V_{DD} = 13\text{ V}; V_{is} = 5\text{ V}$		8		μs
Rise time	t_r	$R_L = 4\text{ }\Omega$		40		μs
Turn-off delay time	$t_{d\ off}$	$V_{DD} = 13\text{ V}; V_{is} = 0\text{ V}$		40		μs
Fall time	t_f	$R_L = 4\text{ }\Omega$		35		μs

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■ Electrical Characteristics Ta = 25°C

Parameter	Symbol	Testconditons	Min	Typ	Max	Unit
Forward voltage	V _{S_{DO}}	I _s = 15 A; V _{is} = 0 V; t _p = 300 ms		1.0	1.5	V
Reverse recovery time	t _{rr}					
Internal drain inductance	L _d			2.5		nH
Internal source inductance	L _s			7.5		nH

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

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

*3Continuous input voltage. Momentary short circuit load connection. (The higher peak current is due to the effect of capacitance C_{gd}).

*4The over temperature protection feature requires a minimum on-state drain source voltage for correct operation.
The specified minimum I_D ensures this condition.

*5The input voltage below which the overload protection circuits will be reset.