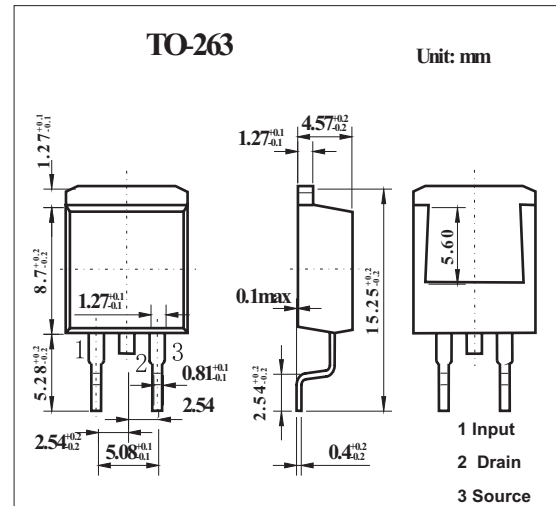


Logic level TOPFET

KUK114-50L

■ Features

- Vertical power DMOS output stage
- Low on-state resistance
- Logic and protection supply from separate pin
- Low operating supply current
- Overload protection against over temperature
- Overload protection against short circuit load
- Latched overload protection reset by protection supply
- Protection circuit condition indicated by flag pin
- 5 V logic compatible input level
- Separate input pin for higher frequency drive
- ESD protection on input, flag and protection supply pins
- Over voltage clamping for turn off of inductive loads
- Both linear and switching operation are possible

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

Parameter	Conditions	Symbol	Rating		Unit
Continuous off-state drain source voltage	$V_{is} = 0\text{ V}$	V_{DSS}	50		V
Continuous input voltage		V_{is}	11		V
Continuous flag voltage		V_{FS}	11		V
Continuous supply voltage		V_{PS}	11		V
Continuous drain current	$T_{mb} \leq 25^\circ\text{C}$	I_D	7	5	V
			15	13	A
Continuous drain current	$T_{mb} \leq 100^\circ\text{C}$	I_D	9.5	8.5	A
Repetitive peak on-state drain current	$T_{mb} \leq 25^\circ\text{C}$	I_{DRM}	60	54	A
Total power dissipation	$T_{mb} = 25^\circ\text{C}$	P_{tot}	40		W
Storage temperature		T_{stg}	-55 to +150		$^\circ\text{C}$
Junction temperature		T_j	150		$^\circ\text{C}$
Lead temperature		T_{sold}	250		$^\circ\text{C}$
Protection supply voltage	$V_{is} =$	V_{PSP}	7	5	V
			4.4	4	V
Protected drain source supply voltage ($V_{PS} = V_{PSN}$)	$V_{is} = 10\text{ V}; R_i \geq 2\text{ k}\Omega$	$V_{DDP(T)}$	50		V
	$V_{is} = 5\text{ V}; R_i \geq 1\text{ k}\Omega$		50		V
Protected drain source supply voltage ($V_{PS} = V_{PSN}; L \leq 10\ \mu\text{H}$)	$V_{is} = 10\text{ V}; R_i \geq 2\text{ k}\Omega$	$V_{DDP(P)}$	25		V
	$V_{is} = 5\text{ V}; R_i \geq 1\text{ k}\Omega$		45		V
Instantaneous overload dissipation		P_{DSM}	0.8		kW
Electrostatic discharge capacitor voltage	$C = 250\text{ pF}; R = 1.5\text{ k}\Omega$	V_c	2		KV
Repetitive peak clamping drain current	$R_{is} \geq 100\ \Omega$	I_{DRRM}	15		A

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■ Absolute Maximum Ratings Ta = 25°C

Parameter	Conditions	Symbol	Rating	Unit
Non-repetitive inductive turn-off energy	$I_{DM} = 15 \text{ A}; R_{is} \geq 100 \Omega$	E_{DSM}	200	mJ
Repetitive inductive turn-off energy	$R_{is} \geq 100 \Omega; T_{mb} \leq 95 \text{ }^\circ\text{C}; I_{DM} = 4 \text{ A}; V_{DD} \leq 20 \text{ V}; f = 250 \text{ Hz}$	E_{DRM}	20	mJ
Repetitive peak drain to input current	$R_{is} = 0 \Omega; t_p \leq 1 \text{ ms}$	I_{DIRM}	50	mA
Continuous forward current	$V_{is} = V_{PS} = V_{FS} = 0 \text{ V}$	I_s	15	A
Junction to mounting base		$R_{th j-mb}$	2.5 to 3.1	K/W

■ Electrical Characteristics Ta = 25°C

Parameter	Symbol	Testconditions	Min	Typ	Max	Unit
Drain-source clamping voltage	$V_{(CL)DSR}$	$R_{is} = 100 \Omega; I_D = 10 \text{ mA}$	50		65	V
Drain-source clamping voltage	$V_{(CL)DSR}$	$R_{is} = 100 \Omega; I_{DM} = 1 \text{ A}; t_p \leq 300 \mu\text{s}; d \leq 0.01$	50		70	V
Zero input voltage drain current	I_{DSS}	$V_{DS} = 12 \text{ V}; V_{is} = 0 \text{ V}$		0.5	10	μA
Drain source leakage current	I_{DSR}	$V_{DS} = 50 \text{ V}; R_{is} = 100 \Omega;$		1	20	μA
Drain source leakage current	I_{DSR}	$V_{DS} = 40 \text{ V}; R_{is} = 100 \Omega; T_j = 125 \text{ }^\circ\text{C}$		10	100	μA
Drain-source on-state resistance ($V_{is}=7\text{V}$) ($V_{is}=5\text{V}$)	$R_{DS(ON)}$	$I_{DM} = 7.5 \text{ A}; t_p \leq 300 \mu\text{s}; d \leq 0.01$		75	100	m Ω
				95	125	m Ω
Overload threshold energy	$E_{DS(TO)}$	$V_{DD} = 13 \text{ V}; V_{is} = 10 \text{ V}(L \leq 10 \text{ mH}; R_i \geq 2 \text{ k}\Omega)$		150		mJ
Response time	$t_{d sc}$	$V_{DD} = 13 \text{ V}; V_{is} = 10 \text{ V}(L \leq 10 \text{ mH}; R_i \geq 2 \text{ k}\Omega)$		375		μs
Threshold junction temperature	$T_{j(TO)}$	$V_{PS} = V_{PSN}; R_i \geq 2 \text{ k}\Omega$ from $I_D \geq 0.65 \text{ A}$	150			$^\circ\text{C}$
Forward transconductance	g_{fs}	$V_{DS} = 10 \text{ V}; I_{DM} = 7.5 \text{ A}; t_p \leq 300 \mu\text{s}; d \leq 0.01$	5	9		S
Drain current ($V_{DS} = 13 \text{ V}$)	I_D	$V_{is} = 5 \text{ V}$		25		A
		$V_{is} = 10 \text{ V}$		40		A
Protection supply current	I_{PS}	$V_{PS} = 5 \text{ V}$		0.2	0.35	mA
Protection reset voltage	V_{PSR}		1.5	2.5	3.5	V
		$T_j = 150 \text{ }^\circ\text{C}$	1.0			V
Protection clamp voltage	$V_{(CL)PS}$	$I_P = 1.35 \text{ mA}$	11	13		V
Forward voltage	V_{SDS}	$I_s = 15 \text{ A}; V_{is} = V_{PS} = V_{FS} = 0 \text{ V}; t_p = 300 \mu\text{s}$		1.0	1.5	V
Reverse recovery time	t_{rr}					
Input threshold voltage	$V_{is(TO)}$	$V_{DS} = 5 \text{ V}; I_D = 1 \text{ mA}$	1.0	1.5	2.0	V
		$T_{mb} = 150 \text{ }^\circ\text{C}$	0.5			V
Input current	I_{is}	$V_{is} = 10 \text{ V}$		10	100	nA
Input clamp voltage	$V_{(CL)IS}$	$I_i = 1 \text{ mA}$	11	13		V
Input resistance	R_{ISL}	$V_{PS} = 5 \text{ V}; I_i = 5 \text{ mA};$		55		Ω
		$T_{mb} = 150 \text{ }^\circ\text{C}$		95		Ω
		$V_{PS} = 10 \text{ V}; I_i = 5 \text{ mA};$		35		Ω
		$T_{mb} = 150 \text{ }^\circ\text{C}$		60		Ω

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■ Electrical Characteristics Ta = 25°C

Parameter	Symbol	Testconditons	Min	Typ	Max	Unit
internal overvoltage clamping	R _{IS}	R _I = ∞ Ω; V _{DS} > 30 V	100			Ω
internal overload protection	R _I	R _{IS} = ∞ Ω; V _{II} = 5 V	1			kΩ
		V _{II} = 10 V	2			kΩ
Turn-on delay time	t _{d on}	V _{DD} = 15 V; V _{IS} : 0 V ⇒ 0 V		8		ns
Rise time	t _r			13		ns
Turn-off delay time	t _{d off}	V _{DD} = 15 V; V _{IS} : 10 V ⇒ 0 V		100		ns
Fall time	t _f			45		ns
Input capacitance	C _{ISS}	V _{DS} = 25 V; V _{IS} = 0 V		415	600	pF
Output capacitance	C _{OSS}	V _{DS} = 25 V; V _{IS} = 0 V		275	400	pF
Reverse transfer capacitance	C _{RSS}	V _{DS} = 25 V; V _{IS} = 0 V		55	80	pF
Protection supply pin capacitance	C _{PSO}	V _{PS} = 10 V		30		pF
Flag pin capacitance	C _{FIS}	V _{FS} = 10 V; V _{PS} = 0 V		20		pF
Flag voltage	V _{FS}	I _F = 1.6 mA		0.15	0.4	V
Flag saturation current	I _{FSS}	V _{FS} = 10 V		15		mA
Flag leakage current	I _{FS}	V _{FS} = 10 V			10	μA
Protection supply threshold voltage	V _{PSF}	V _{FF} = 5 V; R _F = 3 kΩ	2.5	3.3	4	V
Flag clamping voltage	V _{(CL)FS}	I _F = 1 mA; V _{PS} = 0 V	11	13		V
Suitable external pull-up resistance	R _F	V _{FF} = 5 V	1	10	50	kΩ
		V _{FF} = 10 V	2	20	100	kΩ