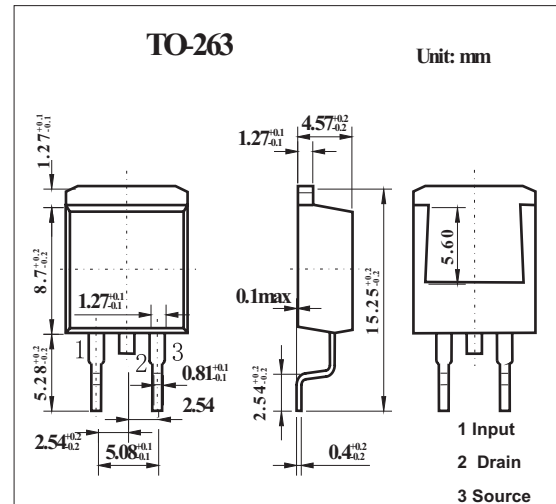


## Logic level TOPFET

## 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

## KUK114-50L

## ■ 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	$\mu\text{A}$
Drain source leakage current	$I_{DSR}$	$V_{DS} = 50 \text{ V}; R_{is} = 100 \Omega;$		1	20	$\mu\text{A}$
Drain source leakage current	$I_{DSR}$	$V_{DS} = 40 \text{ V}; R_{is} = 100 \Omega; T_j = 125 \text{ }^\circ\text{C}$		10	100	$\mu\text{A}$
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	$\text{m}\Omega$
				95	125	$\text{m}\Omega$
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		$\mu\text{s}$
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		$\Omega$
		$T_{mb} = 150 \text{ }^\circ\text{C}$		95		$\Omega$
		$V_{PS} = 10 \text{ V}; I_i = 5 \text{ mA};$		35		$\Omega$
		$T_{mb} = 150 \text{ }^\circ\text{C}$		60		$\Omega$

## KUK114-50L

## ■ Electrical Characteristics Ta = 25°C

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