

Complementary PowerTrench MOSFET

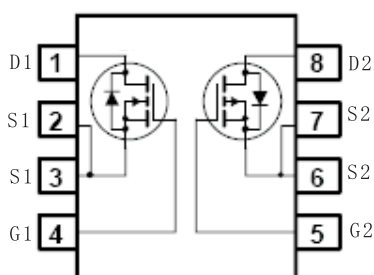
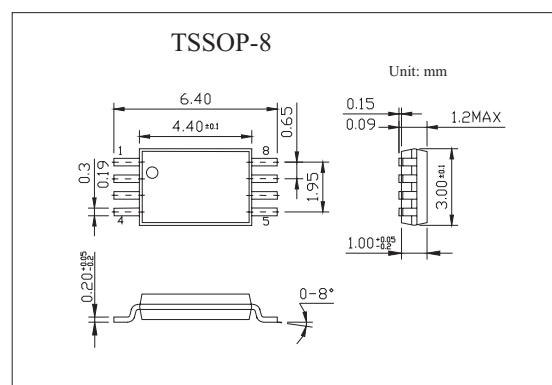
KDW2521C

■ Features

● N-Channel

5.5 A, 20 V $R_{DS(ON)} = 21\text{m}\Omega$ @ $V_{GS} = 4.5\text{ V}$ $R_{DS(ON)} = 35\text{m}\Omega$ @ $V_{GS} = 2.5\text{ V}$

● P-Channel

-3.8 A, 20 V $R_{DS(ON)} = 43\text{ m}\Omega$ @ $V_{GS} = -4.5\text{ V}$ $R_{DS(ON)} = 70\text{ m}\Omega$ @ $V_{GS} = -2.5\text{ V}$ ● High performance trench technology for extremely low $R_{DS(ON)}$ ■ Absolute Maximum Ratings $T_a = 25^\circ\text{C}$

Parameter	Symbol	N-Channel	P- Channel	Unit
Drain to Source Voltage	V _{DSS}	20	-20	V
Gate to Source Voltage	V _{GS}	± 12	± 12	V
Drain Current Continuous (Note 1a)	I _D	5.5	-3.8	A
Drain Current Pulsed		30	-30	A
Power Dissipation for Single Operation (Note 1a)	P _D	1		W
(Note 1b)		0.6		
Operating and Storage Temperature	T _J , T _{STG}	-55 to 150		°C
Thermal Resistance Junction to Ambient (Note 1a)	R _{θJA}	125		°C/W
(Note 1b)		208		°C/W

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■ Electrical Characteristics Ta = 25°C

Parameter	Symbol	Testconditions		Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0 V, I _D = 250 μ A	N-Ch	20			V
		V _{GS} = 0 V, I _D = -250 μ A	P-Ch	-20			
Breakdown Voltage Temperature Coefficient	$\frac{\Delta BV_{DSS}}{\Delta T_J}$	I _D = 250 μ A, Referenced to 25°C	N-Ch		14		mV/°C
		I _D = -250 μ A, Referenced to 25°C	P-Ch		-16		
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 16V, V _{GS} = 0 V	N-Ch			1	μ A
		V _{DS} = -16 V, V _{GS} = 0 V	P-Ch			-1	
Gate-Body Leakage	I _{GSS}	V _{GS} = ± 12V, V _{DS} = 0 V	N-Ch			± 100	nA
		V _{GS} = ± 12 V, V _{DS} = 0 V	P-Ch			± 100	
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μ A	N-Ch	0.6	0.8	1.5	V
		V _{DS} = V _{GS} , I _D = -250 μ A	P-Ch	-0.6	-1.0	-1.5	
Gate Threshold Voltage Temperature Coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	I _D = 250 μ A, Referenced to 25°C	N-Ch		-3.2		mV/°C
		I _D = -250 μ A, Referenced to 25°C	P-Ch		3.0		
Static Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = 4.5 V, I _D =5.5A	N-Ch		17	21	m Ω
		V _{GS} = 2.5 V, I _D = 4.2 A			24	35	
		V _{GS} = 4.5 V, I _D =5.5 A, T _J = 125°C			23	34	
Static Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = -4.5 V, I _D =-3.8 A	P-Ch		36	43	
		V _{GS} = -2.5 V, I _D =-3.0 A			56	70	
		V _{GS} = -4.5 V, I _D =-3.8A, T _J = 125°C			49	69	
On-State Drain Current	I _{D(on)}	V _{GS} = 4.5 V, V _{DS} = 5V	N-Ch	30			A
		V _{GS} = -4.5 V, V _{DS} = -5V	P-Ch	-15			
Forward Transconductance	g _{FS}	V _{DS} = 5V, I _D = 5.5A	N-Ch		26		S
		V _{DS} = -5V, I _D = -3.5A	P-Ch		13.2		
Input Capacitance	C _{iss}	N-Channel V _{DS} = 10 V, V _{GS} = 0 V, f = 1.0 MHz	N-Ch		1082		pF
			P-Ch		1030		
Output Capacitance	C _{oss}	P-Channel V _{DS} = -10 V, V _{GS} = 0 V, f = 1.0 MHz	N-Ch		277		pF
			P-Ch		280		
Reverse Transfer Capacitance	C _{rss}		N-Ch		130		pF
			P-Ch		120		
Turn-On Delay Time	t _{d(on)}	N-Channel V _{DD} = 10 V, I _D = 1 A,	N-Ch		8	20	ns
			P-Ch		11	20	
Turn-On Rise Time	t _r	V _{GS} = 4.5 V, R _{GEN} = 6 Ω (Note 2)	N-Ch		8	27	ns
			P-Ch		18	32	
Turn-Off Delay Time	t _{d(off)}	P-Channel V _{DD} = -10 V, I _D = -1 A,	N-Ch		24	38	ns
			P-Ch		34	55	
Turn-Off Fall Time	t _f	V _{GS} = -4.5 V, R _{GEN} = 6 Ω (Note 2)	N-Ch		8	16	ns
			P-Ch		34	55	
Total Gate Charge	Q _g	N-Channel V _{DS} =10V, I _D =5.5A, V _{GS} =4.5V (Note 2)	N-Ch		12	17	nC
			P-Ch		9.7	16	
Gate-Source Charge	Q _{gs}	P-Channel	N-Ch		2		nC
			P-Ch		2.2		
Gate-Drain Charge	Q _{gd}	V _{DS} =-5V, I _D =-3.8A, V _{GS} =-4.5V (Note 2)	N-Ch		3		nC
			P-Ch		2.4		

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Parameter	Symbol	Testconditions		Min	Typ	Max	Unit
Maximum Continuous Drain-Source Diode Forward Current	Is		N-Ch			0.83	A
			P-Ch			-0.83	
Drain-Source Diode Forward Voltage	VSD	VGS = 0 V, Is = 0.83A (Not 2)	N-Ch		0.7	1.2	V
		VGS = 0 V, Is = -0.83A (Not 2)	P-Ch		-0.7	-1.2	

Notes:

1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.
 - a) $R_{\theta JA}$ is 125℃/W (steady state) when mounted on a 1 inch□copper pad on FR-4.
 - b) $R_{\theta JA}$ is 208℃/W (steady state) when mounted on a minimum copper pad on FR-4.
2. Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%