Complementary PowerTrench MOSFET

KDW2521C

■ Features

- N-Channel

  5.5 A, 20 V $R_{DS(ON)}$ = 21mΩ @ V_{GS} = 4.5 V

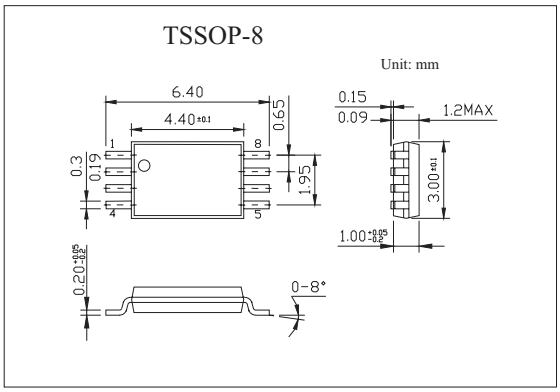
  $R_{DS(ON)}$ = 35mΩ @ V_{GS} =2.5V

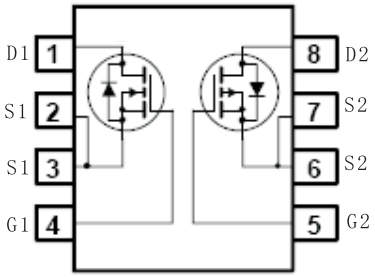
- P-Channel

  -3.8 A, 20 V $R_{DS(ON)}$ = 43 mΩ @ VGS =- 4.5 V

  $R_{DS(ON)}$ = 70 mΩ @ V_{GS} =-2.5V

- High performance trench technology for extremely low $R_{DS(ON)}$





■ Absolute Maximum Ratings Ta = 25℃

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		℃
Thermal Resistance Junction to Ambient (Note 1a)	$R_{\theta JA}$	125		℃/W
(Note 1b)		208		℃/W

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■ Electrical Characteristics Ta = 25℃

Parameter	Symbol	Testconditons		Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	B_{VDSS}	V_{GS} = 0 V, I_D = 250 μA	N-Ch	20			V
		V_{GS} = 0 V, I_D = -250 μA	P-Ch	-20			
Breakdown Voltage Temperature Coefficient	$\frac{\Delta BV_{DSS}}{\Delta T_J}$	I_D = 250 μA, Referenced to 25℃	N-Ch		14		mV/℃
		I_D = -250 μA, Referenced to 25℃	P-Ch		-16		
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 16V, V_{GS} = 0 V	N-Ch			1	μA
		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 μA	N-Ch	0.6	0.8	1.5	V
		V_{DS} = V_{GS}, I_D = -250 μA	P-Ch	-0.6	-1.0	-1.5	
Gate Threshold Voltage Temperature Coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	I_D = 250 μA, Referenced to 25℃	N-Ch		-3.2		mV/℃
		I_D = -250 μA, Referenced to 25℃	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	mΩ
		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℃			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℃			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	N-Ch		1082		pF
		V_{DS} = 10 V, V_{GS} = 0 V,f = 1.0 MHz	P-Ch		1030		
Output Capacitance	C_{oss}		N-Ch		277		pF
		P-Channel	P-Ch		280		
Reverse Transfer Capacitance	C_{rss}	V_{DS} = -10 V, V_{GS} = 0 V,f = 1.0 MHz	N-Ch		130		pF
			P-Ch		120		
Turn-On Delay Time	$t_{d(on)}$	N-Channel	N-Ch		8	20	ns
		V_{DD} = 10 V, I_D = 1 A,	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	N-Ch		24	38	ns
		V_{DD} = -10 V, I_D = -1 A,	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	N-Ch		12	17	nC
		V_{DS} =10V,I_D=5.5A,V_{GS}=4.5V	P-Ch		9.7	16	
Gate-Source Charge	Q_{gs}	(Note 2)	N-Ch		2		nC
		P-Channel	P-Ch		2.2		
Gate-Drain Charge	Q_{gd}	V_{DS}=-5V,I_D=-3.8A,V_{GS}=-4.5V	N-Ch		3		nC
		(Note 2)	P-Ch		2.4		

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Parameter	Symbol	Testconditons		Min	Typ	Max	Unit
Maximum Continuous Drain-Source Diode Forward Current	I_S		N-Ch			0.83	A
			P-Ch			-0.83	
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS} = 0 V, I_S = 0.83A (Not 2)	N-Ch		0.7	1.2	V
		V_{GS} = 0 V, I_S = -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%