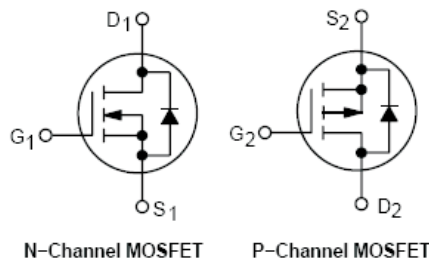
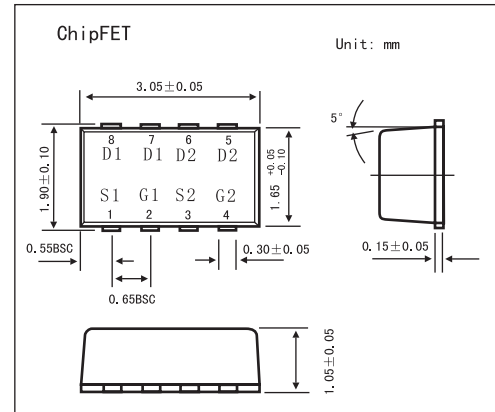


Power MOSFET

KTHC5513

■ Features

- Complementary N-Channel and P-Channel MOSFET
Leadless SMD Package Featuring Complementary Pair
- Low $R_{DS(on)}$ in a ChipFET Package for High Efficiency Performance
- Low Profile (< 1.10 mm) Allows Placement in Extremely Thin Environments Such as Portable Electronics

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

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-source voltage	V_{DS}	20		V
Gate-source voltage	V_{GS}	± 12		V
Drain current Continuous *1 $T_A = 25^\circ\text{C}$	I_D	2.9	-2.2	A
$T_A = 85^\circ\text{C}$		2.1	-1.6	
$t \leq 5$		3.9	-3	
Drain current Pulsed $t = 10 \mu\text{s}$ *1	I_{DM}	12	-9	A
Total power dissipation	P_D	1.1		W
$t \leq 5$		2.1		W
Operating and Storage Temperature Range	T_J, T_{stg}	-55 to 150		$^\circ\text{C}$
Lead Temperature for Soldering Purposes	T_L	260		$^\circ\text{C}$
Junction-to-Ambient *1	$R_{\theta JA}$	Steady State		$^\circ\text{C/W}$
$t \leq 5$		60		

*1 Surface Mounted on FR4 board using 1 in sq pad size

KTHC5513

■ Electrical Characteristics Ta = 25°C

Parameter	Symbol	Testconditons	Min	Typ	Max	Unit	
Drain-source breakdown voltage	V _{(BR) DSS}	I _D =250 μ A, V _{GS} =0V	N-Ch	20			V
		I _D =-250 μ A, V _{GS} =0V	P-Ch	-20			
Zero gate voltage drain current	I _{DSS}	V _{DS} =16V, V _{GS} =0V	N-Ch			1	μ A
		V _{DS} =16V, V _{GS} =0V, T _J = 85°C				5	
		V _{DS} =-16V, V _{GS} =0V	P-Ch			-1	
		V _{DS} =-16V, V _{GS} =0V, T _J = 85°C				-5	
Gate-to-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 12 V	N-Ch			± 100	nA
			P-Ch			± 100	
Gate threshold voltage *1	V _{GS (th)}	V _{DS} = V _{GS} , I _D = 250 μ A	N-Ch	0.6		1.2	V
		V _{DS} = V _{GS} , I _D = -250 μ A	P-Ch	-0.6		-1.2	
Static drain-source on-state resistance *1	R _{DS (on)}	I _D =2.9A, V _{GS} =4.5A	N-Ch		0.058	0.08	Ω
		I _D =2.3A, V _{GS} =2.5V			0.077	0.115	
Static drain-source on-state resistance *1	R _{DS (on)}	I _D =-2.2A, V _{GS} =-4.5V	P-Ch		0.13	0.155	Ω
		I _D =-1.7A, V _{GS} =-2.5V			0.200	0.240	
Forward Transconductance	g _{FS}	I _D =2.9A, V _{DS} =10V	N-Ch		6.0		S
		I _D =-2.2A, V _{DS} =-10V	P-Ch		6.0		
Input capacitance	C _{iss}	N-Channel V _{DS} =10V, V _{GS} =0V, f=1MHz	N-Ch		180		pF
			P-Ch		185		
Output capacitance	C _{oss}	P-Channel	N-Ch		80		pF
			P-Ch		95		
Reverse transfer capacitance	C _{rss}	V _{DS} =-10V, V _{GS} =0V, f=1MHz	N-Ch		25		pF
			P-Ch		30		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 4.5 V, V _{DS} = 10 V, I _D = 2.9 A	N-Ch		2.6	4.0	nC
		V _{GS} =-4.5 V, V _{DS} = -10 V, I _D =-2.2 A	P-Ch		3.0	6.0	
Gate-to-Source Gate Charge	Q _{GS}	V _{GS} = 4.5 V, V _{DS} = 10 V, I _D = 2.9 A	N-Ch		0.6		nC
		V _{GS} =-4.5 V, V _{DS} =-10 V, I _D =-2.2 A	P-Ch		0.5		
Gate-to-Drain "Miller" Charge	Q _{GD}	V _{GS} = 4.5 V, V _{DS} = 10 V, I _D = 2.9 A	N-Ch		0.7		nC
		V _{GS} =-4.5 V, V _{DS} =-10 V, I _D =-2.2 A	P-Ch		0.9		
Turn-on delay time	t _{d (on)}	I _D =2.9A, V _{DD} =16V	N-Ch		5.0	10	ns
		I _D =-2.2A, V _{DD} =-16V	P-Ch		7.0	12	
Rise time	t _r	N-Channel V _{GS} =4.5V, R _G =2.5 Ω *2	N-Ch		9	18	ns
			P-Ch		13	25	
Turn-off delay time *1	t _{d (off)}	P-Channel	N-Ch		10	20	ns
			P-Ch		33	50	
Fall time *1	t _f	V _{GS} =-4.5V, R _G =2.5 Ω *2	N-Ch		3.0	6.0	ns
			P-Ch		27	40	
Forward Voltage *1	V _{SD}	I _S =2.6 A, V _{GS} =0V	N-Ch		0.8	1.15	V
		I _S =-2.1 A, V _{GS} =0 V	P-Ch		-0.8	-1.15	

KTHC5513

■ Electrical Characteristics Ta = 25°C

Parameter	Symbol	Testconditons	Min	Typ	Max	Unit		
Reverse Recovery Time	t _{rr}	V _{GS} = 0 V,dis/dt = 100 A/μ s,I _S =1.5 A	N-Ch		12.5		ns	
			P-Ch		32			
	t _a		N-Ch		9			
			P-Ch		10			
	t _b		P-Channel	N-Ch		3.5		
				P-Ch		22		
Reverse Recovery Storage Charge	Q _{RR}	V _{GS} = 0 V,dis/dt = 100 A/μ s,I _S =?1.5A	N-Ch		6		μ C	
			P-Ch		15			

*1 Pulse Test: Pulse Width ≤250 μ s, Duty Cycle ≤2%.

*2 Switching characteristics are independent of operating junction temperature.