CPD004

20V Complementary Enhancement-Mode MOSFET

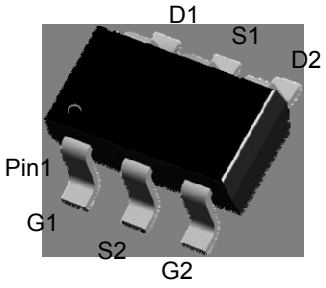
General Description

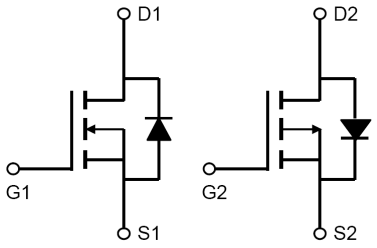
- Low gate charge.
- Use as a load switch.
- Use in PWM applications

Product Summary

N-Channel	P-Channel
• BV_{DSS} =20V	• BV_{DSS} = -20V
• $R_{DS(on)}$ (@VGS= 10V) < 30mΩ	• $R_{DS(on)}$ (@VGS= -10V) < 85mΩ
• $R_{DS(on)}$ (@VGS= 4.5V) < 35mΩ	• $R_{DS(on)}$ (@VGS= -4.5V) < 95mΩ

SOT23-6L





N-Channel P-Channel

Absolute Maximum Ratings (T_A = 25°C unless otherwise noted)

Parameter	Symbol	Maximum		Units
		N-Channel	P-Channel	
Drain-Source Voltage	V_{DS}	20	-20	V
Gate-Source Voltage	V_{GS}	±12	±12	V
Drain Current (T_A=25ºC)	I_D	3.5	-2.5	A
Drain Current (T_A=75ºC)		2.5	-1.5	A
Pulsed Drain Current [a]	I_{DM}	12	-10	A
Power Dissipation [b] (T_A=25ºC)	P_D	1.25	1.25	W
Power Dissipation [b] (T_A=75ºC)		0.75	0.75	W
Junction and Storage Temperature Range	T_J, T_{STG}	-55 ~ +150	-55 ~ +150	ºC

Thermal Characteristics

Parameter	Symbol	Maximum		Units
		N-Channel	P-Channel	
Junction-to-Ambient [a] (t ≤ 10s)	$R_{\theta JA}$	100	100	ºC/W
Junction-to-Ambient [a,d] (Steady-State)		130	130	ºC/W
Junction-to-Lead (Steady-State)	$R_{\theta JL}$	90	90	ºC/W

N-Channel Electrical Characteristics (T_A = 25°C unless otherwise noted)						
Symbol	**Parameter**	**Conditions**	**Min**	**Typ**	**Max**	**Units**
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V , I_D = 250uA	20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 20V , V_{GS} = 0V			1	uA
I_{GSS}	Gate-Body Leakage Current	V_{GS} = ±12V, V_{DS} = 0V			±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS} , I_D = 250uA	0.4		1.0	V
$R_{DS(ON))}$	Drain-Source On-State Resistance	V_{GS} = 10V , I_D = 4.5A		22	30	mΩ
		V_{GS} = 4.5V , I_D = 3.5A		28	44	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 10V , I_D = 4.5A		20		S
Drain-Source Diode Characteristics						
V_{SD}	Diode Forward Voltage	V_{GS} = 0V , I_S = 1.0A			1.2	V
I_S	Maximum Body-Diode Continuous Current				2.0	A
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 10V , V_{GS} = 0V f = 1.0MHz		540		pF
C_{oss}	Output Capacitance			86		pF
C_{rss}	Reverse Transfer Capacitance			72		pF
Switching Characteristics						
Q_g	Total Gate Charge	V_{DS} = 10V , I_D = 4.5A V_{GS} = 6V		14		nC
Q_{gs}	Gate-Source Charge			2.2		nC
Q_{gd}	Gate-Drain Charge			3.1		nC
$t_{D(ON)}$	Turn-On Delay Time	V_{DD} = 10V , ID = 1A V_{GS} = 6 V R_{GEN} = 3 ohm		10		ns
t_r	Turn-On Rise Time			5		ns
$t_{D(OFF)}$	Turn-Off Delay Time			24		ns
t_f	Turn-Off Fall Time			11		ns

a. Repetitive rating, Pulse width limited by junction temperature $T_{J(MAX)}$=150 ºC. Ratings are based on low frequency and duty cycles to keep initial T_J=25 ºC

b. The power dissipation P_D is based on $T_{J(MAX)}$=150 ºC , using≤10s junction-to-ambient thermal resistance.

c. The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A = 25°C. The value in any given application depends on the user's specific board design.

d. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ and lead to ambient.

P-Channel Electrical Characteristics (T_A = 25°C unless otherwise noted)						
Symbol	**Parameter**	**Conditions**	**Min**	**Typ**	**Max**	**Units**
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V , I_D = -250uA	-20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -20V , V_{GS} = 0V			-1	uA
I_{GSS}	Gate-Body Leakage Current	V_{GS} = ±12V, V_{DS} = 0V			±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS} , I_D = -250uA	-0.4		-1.0	V
$R_{DS(ON))}$	Drain-Source On-State Resistance	V_{GS} = -10V , I_D = -3.5A		75	85	mΩ
		V_{GS} = -4.5V , I_D = -2.5A		80	95	mΩ
g_{FS}	Forward Transconductance	V_{DS} = -10V , I_D = -3.5A		24		S
Drain-Source Diode Characteristics						
V_{SD}	Diode Forward Voltage	V_{GS} = 0V , I_S = -1.0A			-1.2	V
I_S	Maximum Body-Diode Continuous Current				-1.8	A
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = -10V , V_{GS} = 0V f = 1.0MHz		492		pF
C_{oss}	Output Capacitance			95		pF
C_{rss}	Reverse Transfer Capacitance			64		pF
Switching Characteristics						
Q_g	Total Gate Charge	V_{DS} = -10V , I_D = -3.5A V_{GS} = -6V		25		nC
Q_{gs}	Gate-Source Charge			4		nC
Q_{gd}	Gate-Drain Charge			6		nC
$t_{D(ON)}$	Turn-On Delay Time	V_{DD} = -10V , ID = -1A V_{GS} = -6 V R_{GEN} = 6 ohm		11		ns
t_r	Turn-On Rise Time			5.4		ns
$t_{D(OFF)}$	Turn-Off Delay Time			23		ns
t_f	Turn-Off Fall Time			8		ns

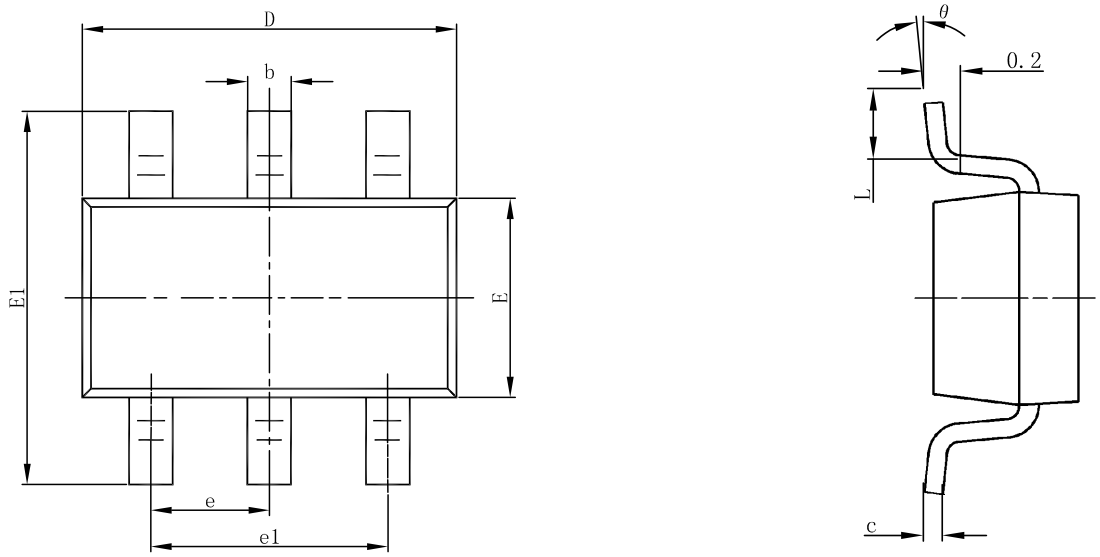
a. Repetitive rating, Pulse width limited by junction temperature $T_{J(MAX)}$=150 ºC. Ratings are based on low frequency and duty cycles to keep initial T_J=25 ºC

b. The power dissipation P_D is based on $T_{J(MAX)}$=150 ºC , using≤10s junction-to-ambient thermal resistance.

c. The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A = 25°C. The value in any given application depends on the user's specific board design.

d. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ and lead to ambient.

SOT23-6L Package Outline



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°