

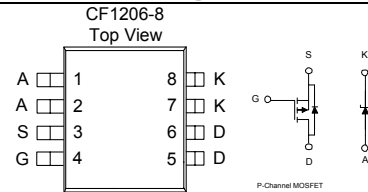
## P-Channel 20-V (D-S) MOSFET With Schottky Diode

These miniature surface mount MOSFETs utilize a high cell density trench process to provide low  $r_{DS(on)}$  and to ensure minimal power loss and heat dissipation. Typical applications are DC-DC converters and power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

- Low  $r_{DS(on)}$  provides higher efficiency and extends battery life
- Low thermal impedance copper leadframe CF1206-8 saves board space
- Fast switching speed
- High performance trench technology

MOSFET PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ (OHM)	$I_D$ (A)
-20	0.110 @ $V_{GS} = -4.5V$	$\pm 3.6$
	0.160 @ $V_{GS} = -2.5V$	$\pm 3.0$

SCHOTTKY PRODUCT SUMMARY		
$V_{KA}$ (V)	$V_F$ (V) Diode Forward Voltage	$I_F$ (A)
20	0.48V @ 1.0A	1.0



ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Maximum	Units
Drain-Source Voltage (MOSFET)		$V_{DS}$	-20	V
Reverse Voltage (Schottky)		$V_{KA}$	20	
Gate-Source Voltage (MOSFET)		$V_{GS}$	$\pm 8$	
Continuous Drain Current ( $T_J = 150^\circ\text{C}$ ) (MOSFET) <sup>a</sup>	$T_A = 25^\circ\text{C}$	$I_D$	$\pm 2.5$	A
	$T_A = 70^\circ\text{C}$		$\pm 1.9$	
Pulsed Drain Current (MOSFET) <sup>b</sup>		$I_{DM}$	$\pm 10$	
Continuous Source Current (MOSFET Diode Conduction) <sup>a</sup>		$I_S$	-1.6	
Average Forward Current (Schottky)		$I_F$	0.5	
Pulsed Forward Current (Schottky)		$I_{FM}$	8	
Maximum Power Dissipation (MOSFET) <sup>a</sup>	$T_A = 25^\circ\text{C}$	$P_D$	2.1	W
	$T_A = 70^\circ\text{C}$		1.1	
Maximum Power Dissipation (Schottky) <sup>a</sup>	$T_A = 25^\circ\text{C}$		1.3	
	$T_A = 70^\circ\text{C}$		0.68	
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	-55 to 150	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typ	Max	
Maximum Junction-to-Ambient <sup>a</sup>	$t \leq 5$ sec	$R_{thJA}$	50	60	$^\circ\text{C/W}$
	Steady State		90	110	

Notes

- Surface Mounted on 1" x 1" FR4 Board.
- Pulse width limited by maximum junction temperature

**MOSFET SPECIFICATIONS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)**

Parameter	Symbol	Test Conditions	Limits			Unit
			Min	Typ	Max	
Static						
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = -250\text{ }\mu\text{A}$	-0.4			
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 8\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -16\text{ V}$ , $V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
		$V_{DS} = -16\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 55^\circ\text{C}$			-10	
On-State Drain Current <sup>A</sup>	$I_{D(on)}$	$V_{DS} = -5\text{ V}$ , $V_{GS} = -4.5\text{ V}$	-5			A
Drain-Source On-State Resistance <sup>A</sup>	$r_{DS(on)}$	$V_{GS} = -4.5\text{ V}$ , $I_D = -3.6\text{ A}$			0.110	$\Omega$
		$V_{GS} = -2.5\text{ V}$ , $I_D = -3.0\text{ A}$			0.160	
Forward Tranconductance <sup>A</sup>	$g_{fs}$	$V_{DS} = -5\text{ V}$ , $I_D = -3.6\text{ A}$		3		S
Diode Forward Voltage	$V_{SD}$	$I_S = -1.6\text{ A}$ , $V_{GS} = 0\text{ V}$		-0.70		V
Dynamic <sup>b</sup>						
Total Gate Charge	$Q_g$	$V_{DS} = -5\text{ V}$ , $V_{GS} = -4.5\text{ V}$ , $I_D = -3.6\text{ A}$		6.0		nC
Gate-Source Charge	$Q_{gs}$			0.80		
Gate-Drain Charge	$Q_{gd}$			1.30		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -5\text{ V}$ , $R_L = 5\text{ }\Omega$ , $V_{GEN} = -4.5\text{ V}$ , $R_G = 6\text{ }\Omega$		6.5		ns
Rise Time	$t_r$			20		
Turn-Off Delay Time	$t_{d(off)}$			31		
Fall-Time	$t_f$			21		

**SCHOTTKY SPECIFICATIONS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)**

Parameter	Symbol	Test Conditions	Limits			Unit
			Min	Typ	Max	
Forward Voltage Drop	$V_F$	$I_F = 0.5\text{ A}$			0.48	V
		$I_F = 0.5\text{ A}$ , $T_J = 125^\circ\text{C}$			0.4	V
Maximum Reverse Leakage Current	$I_{rm}$	$V_r = 30\text{ V}$			0.1	mA
		$V_r = 30\text{ V}$ , $T_J = 75^\circ\text{C}$			1	
		$V_r = 30\text{ V}$ , $T_J = 125^\circ\text{C}$			10	
Junction Capacitance	$C_T$	$V_r = 10\text{ V}$		31		pF

## Notes

- Pulse test:  $PW \leq 300\mu\text{s}$  duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.

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Typical Electrical Characteristics

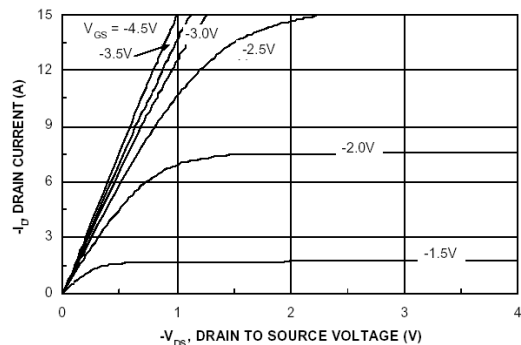


Figure 1. On-Region Characteristics

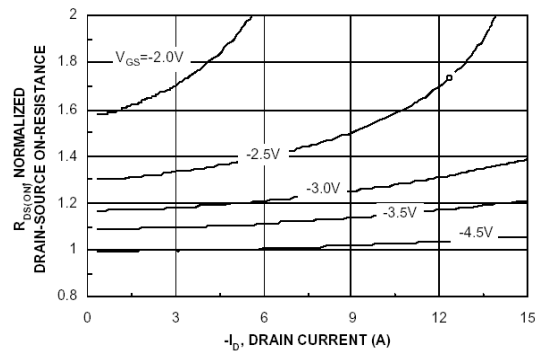


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage

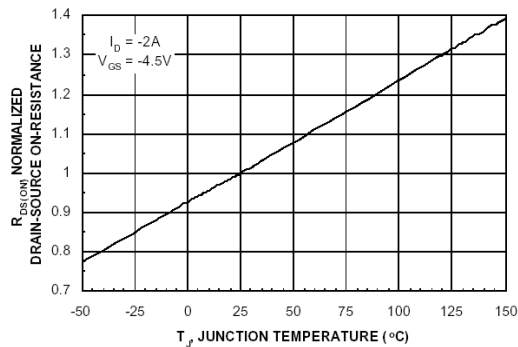


Figure 3. On-Resistance Variation with Temperature

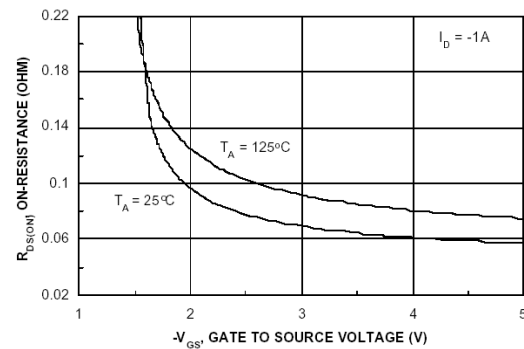


Figure 4. On-Resistance Variation with Gate to Source Voltage

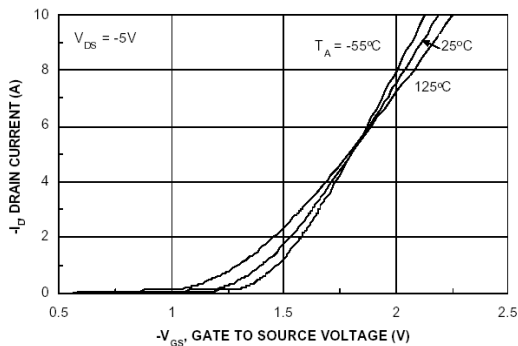


Figure 5. Transfer Characteristics

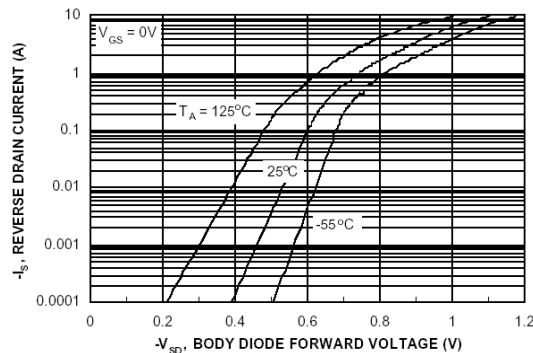


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature

Typical Electrical Characteristics

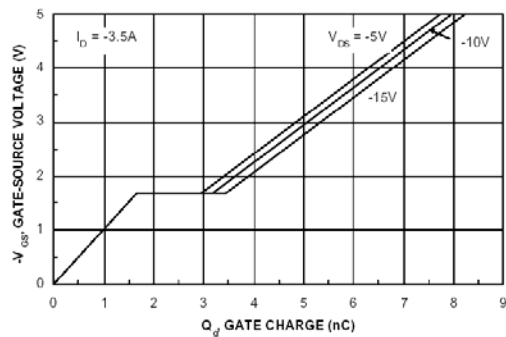


Figure 7. Gate Charge Characteristic

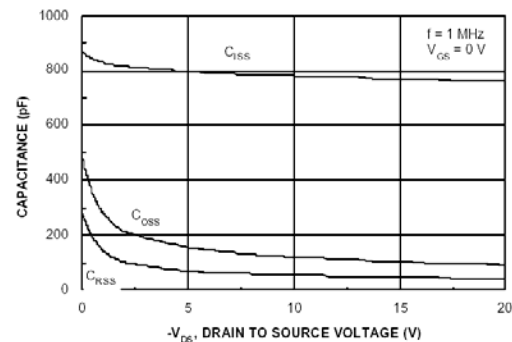


Figure 8. Capacitance Characteristic

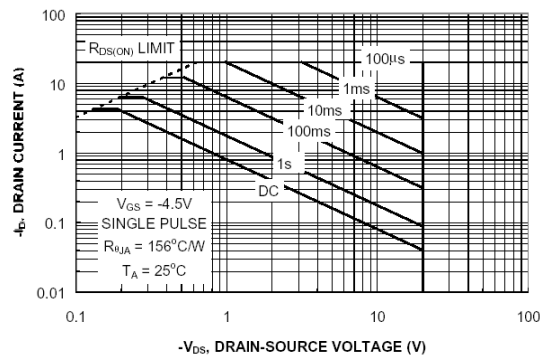


Figure 9. Maximum Safe Operating Area

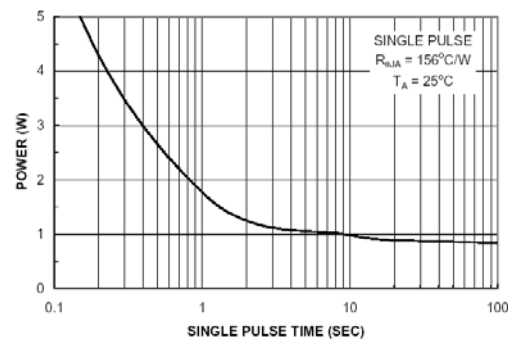


Figure 10. Single Pulse Maximum Power Dissipation

Normalized Thermal Transient Junction to Ambient

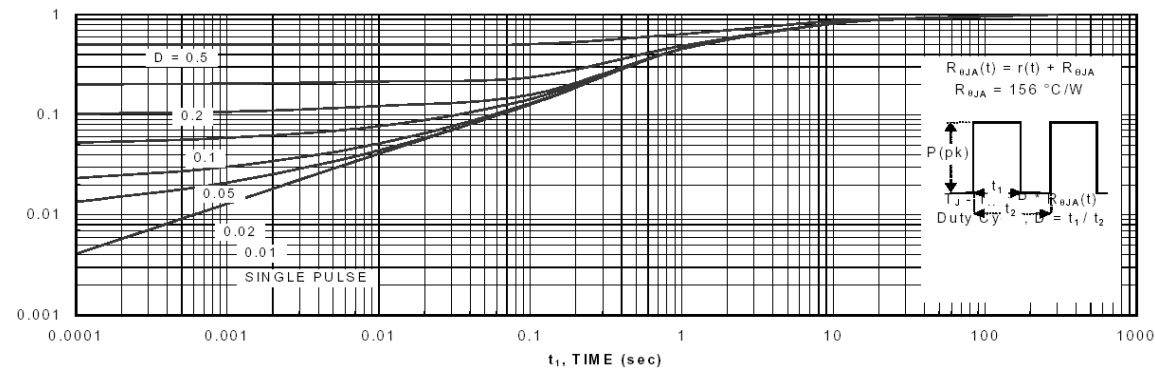
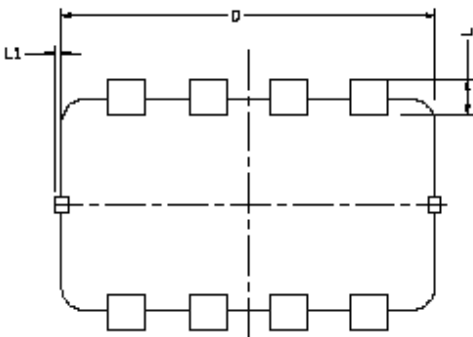
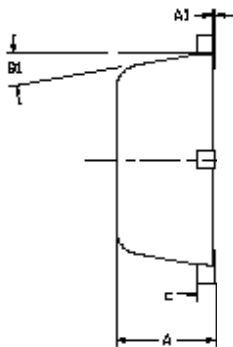
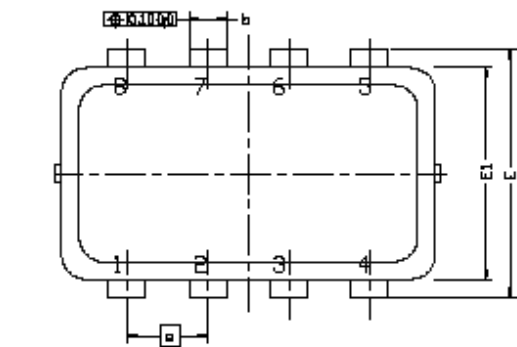


Figure 11. Transient Thermal Response Curve.

# Package Information



DIM.	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.700	0.80	0.900	0.0276	0.0313	0.0354
A1	0.00	---	0.03	0.000	---	0.002
b	0.24	0.30	0.35	0.009	0.012	0.014
c	0.08	0.152	0.25	0.003	0.006	0.010
D	3.00 BSC			0.118 BSC		
E	2.00 BSC			0.079 BSC		
E1	1.70 BSC			0.067 BSC		
e	0.65 BSC			0.026 BSC		
L	0.20	0.275	0.400	0.008	0.011	0.0157
L1	0	---	0.100	0	---	0.004
Ø	0°	10°	12°	0°	10°	12°