

# CEM9936



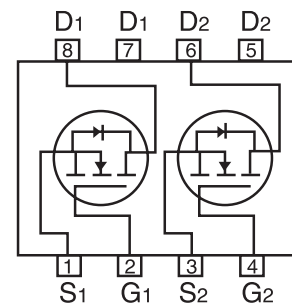
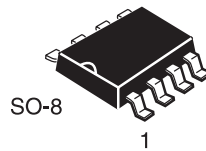
March 1998

## Dual N-Channel Enhancement Mode Field Effect Transistor

5

### FEATURES

- 30V , 5A ,  $R_{DS(ON)}=50m\Omega$  @  $V_{GS}=10V$ .  
 $R_{DS(ON)}=80m\Omega$  @  $V_{GS}=4.5V$ .
- Super high dense cell design for extremely low  $R_{DS(ON)}$ .
- High power and current handling capability.
- Surface Mount Package.



### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V <sub>DS</sub>	30	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Drain Current-Continuous <sup>a</sup> @ $T_J=125^\circ\text{C}$ -Pulsed <sup>b</sup>	I <sub>D</sub>	±5	A
	I <sub>DM</sub>	±40	A
Drain-Source Diode Forward Current <sup>a</sup>	I <sub>S</sub>	1.7	A
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	2	W
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to 150	°C

### THERMAL CHARACTERISTICS

Thermal Resistance, Junction-to-Ambient <sup>a</sup>	$R_{\theta JA}$	62.5	°C/W
--	-----------------	------	------

# CEM9936

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C unless otherwise noted)

5

Parameter	Symbol	Condition	Min	Typ <sup>c</sup>	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	30			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V			1	μA
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V			±100	nA
<b>ON CHARACTERISTICS<sup>b</sup></b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1	1.5	3	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =5A			50	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =3.9A			80	mΩ
On-State Drain Current	I <sub>D(ON)</sub>	V <sub>DS</sub> =5V, V <sub>GS</sub> =10V	20			A
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =15V, I <sub>D</sub> =5A		8		S
<b>DYNAMIC CHARACTERISTICS<sup>c</sup></b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V f=1.0MHz		500	650	pF
Output Capacitance	C <sub>OSS</sub>			267	350	pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			93	120	pF
<b>SWITCHING CHARACTERISTICS<sup>c</sup></b>						
Turn-On Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =15V, I <sub>D</sub> =1A, V <sub>GEN</sub> =10V, R <sub>GEN</sub> =6Ω		10	15	ns
Rise Time	t <sub>r</sub>			9	20	ns
Turn-Off Delay Time	t <sub>D(OFF)</sub>			20	55	ns
Fall Time	t <sub>f</sub>			9	28	ns
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =15V, I <sub>D</sub> =5A, V <sub>GS</sub> =10V		34	50	nC
Gate-Source Charge	Q <sub>gs</sub>			4		nC
Gate-Drain Charge	Q <sub>gd</sub>			7		nC

# CEM9936

## ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ unless otherwise noted)

5

Parameter	Symbol	Condition	Min	Typ <sup>c</sup>	Max	Unit
<b>DRAIN-SOURCE DIODE CHARACTERISTICS<sup>b</sup></b>						
Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0V, I_S = 1.7A$		0.8	1.2	V

### Notes

- a. Surface Mounted on FR4 Board,  $t \leq 10\text{sec}$ .
- b. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
- c. Guaranteed by design, not subject to production testing.

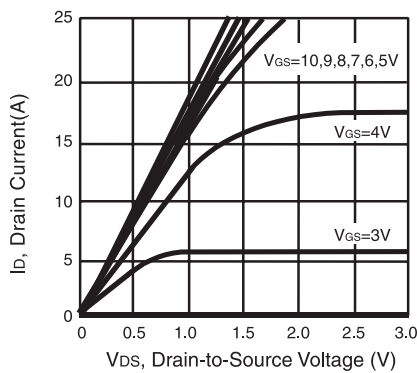


Figure 1. Output Characteristics

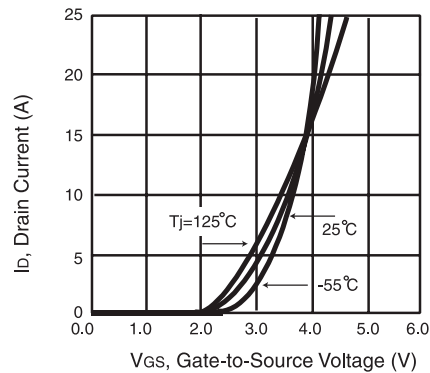


Figure 2. Transfer Characteristics

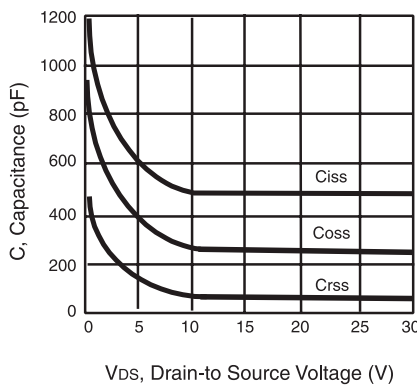


Figure 3. Capacitance

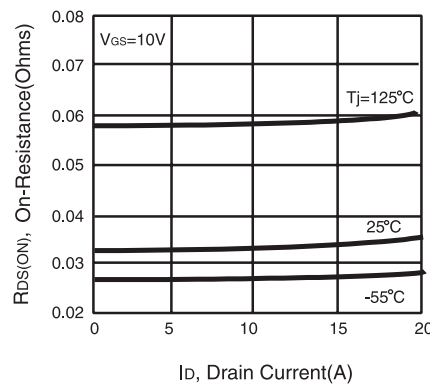
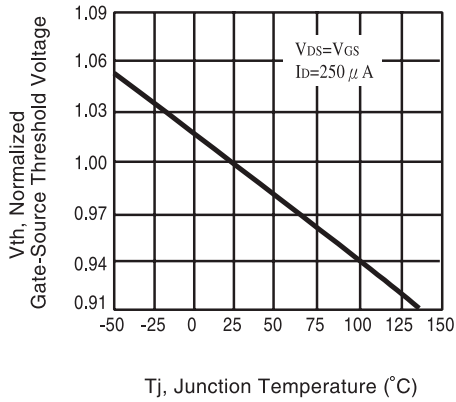


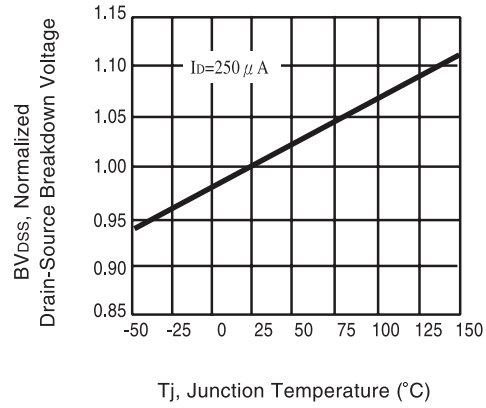
Figure 4. On-Resistance Variation with Drain Current and Temperature

# CEM9936

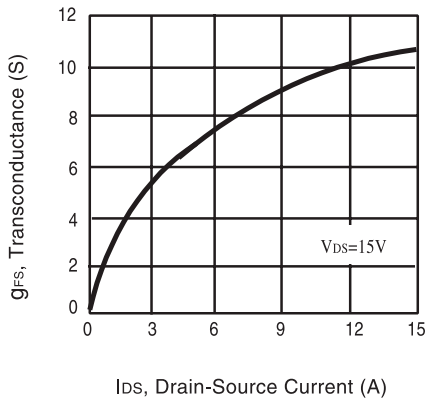
5



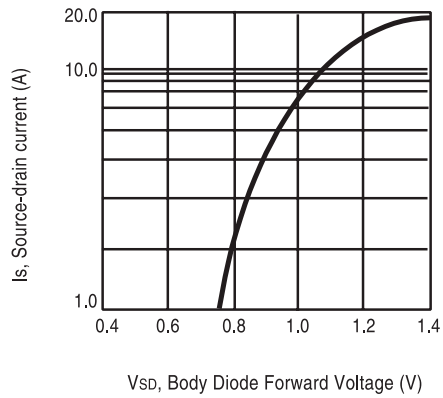
**Figure 5. Gate Threshold Variation with Temperature**



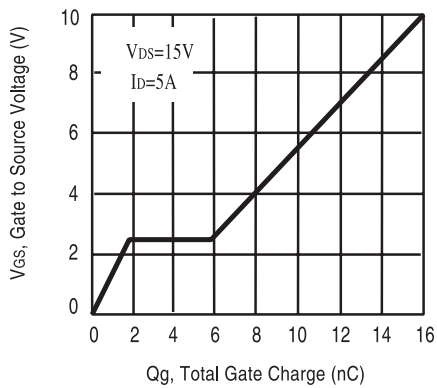
**Figure 6. Breakdown Voltage Variation with Temperature**



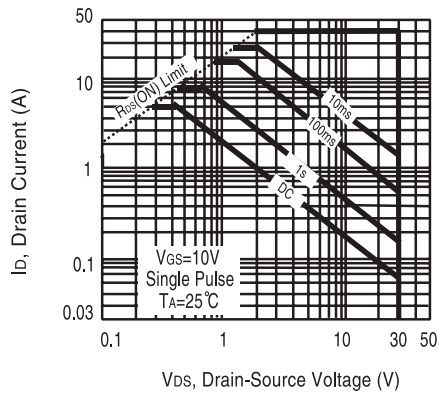
**Figure 7. Transconductance Variation with Drain Current**



**Figure 8. Body Diode Forward Voltage Variation with Source Current**



**Figure 9. Gate Charge**



**Figure 10. Maximum Safe Operating Area**

# CEM9936

5

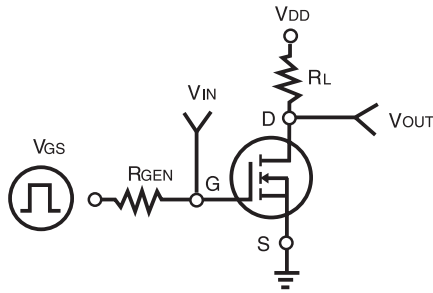


Figure 11. Switching Test Circuit

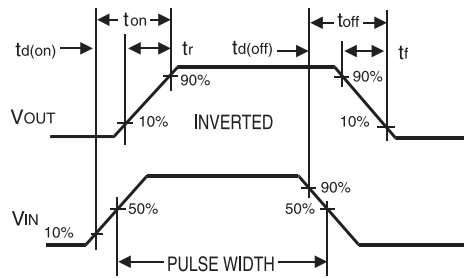


Figure 12. Switching Waveforms

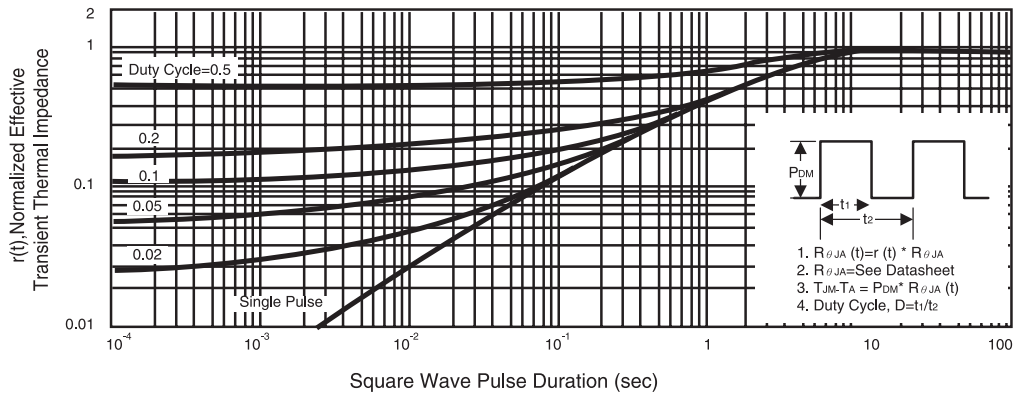


Figure 13. Normalized Thermal Transient Impedance Curve