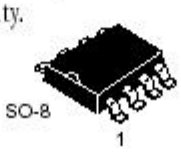
CEM9939

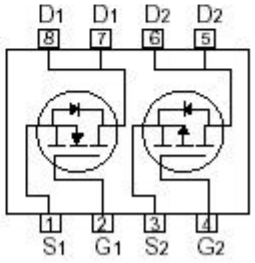
Dual Enhancement Mode Field Effect Transistor (N and P Channel)

5

FEATURES

- 30V , 3.5A , $R_{DS(ON)}$=50mΩ @V_{GS}=10V.
  $R_{DS(ON)}$=80mΩ @V_{GS}=4.5V.
- -30V , -3.5A , $R_{DS(ON)}$=100mΩ @V_{GS}=-10V.
  $R_{DS(ON)}$=160mΩ @V_{GS}=-4.5V.
- Super high dense cell design for extremely low $R_{DS(ON)}$.
- High power and current handing capability.
- Surface Mount Package.





ABSOLUTE MAXIMUM RATINGS (T_A=25°C unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V_{DS}	30	-30	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Drain Current-Continuous[a] @T_J=125°C	I_D	±3.5	±3.5	A
-Pulsed[b]	I_{DM}	±14.0	±14.0	A
Drain-Source Diode Forward Current[a]	I_S	1.7	-1.7	A
Maximum Power Dissipation[a]	P_D	2.0		W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150		°C

THERMAL CHARACTERISTICS

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

N-Channel ELECTRICAL CHARACTERISTICS (T_A=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ[c]	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V, I_D= 250μA	30			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 24V, V_{GS}= 0V			1	μA
Gate-Body Leakage	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V			±100	nA
ON CHARACTERISTICS[b]						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1	1.5	3	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS} =10V, I_D= 3.5A		27	50	mΩ
		V_{GS} =4.5V, I_D= 2.5A		40	80	mΩ
On-State Drain Current	$I_{D(ON)}$	V_{DS} = 5V, V_{GS} = 10V	14			A
Forward Transconductance	g_{FS}	V_{DS} = 15V, I_D = 3.5A	3	8		S
DYNAMIC CHARACTERISTICS[c]						
Input Capacitance	C_{ISS}	V_{DS} =15V, V_{GS} = 0V f =1.0MHz		500		pF
Output Capacitance	C_{OSS}			267		pF
Reverse Transfer Capacitance	C_{RSS}			93		pF
SWITCHING CHARACTERISTICS[c]						
Turn-On Delay Time	$t_{D(ON)}$	V_{DD} = 15V, I_D = 1A, V_{GEN} = 10V, R_{GEN} = 6 Ω		9	15	ns
Rise Time	t_r			9	20	ns
Turn-Off Delay Time	$t_{D(OFF)}$			25	50	ns
Fall Time	t_f			20	35	ns
Total Gate Charge	Q_g	V_{DS} =10V, I_D = 3.5A, V_{GS} =10V		16	21	nC
Gate-Source Charge	Q_{gs}			3		nC
Gate-Drain Charge	Q_{gd}			4.5		nC

P-Channel ELECTRICAL CHARACTERISTICS (T_A=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ[c]	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0V, I_D = 250μA	-30			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = -24V, V_{GS} = 0V			-1	μA
Gate-Body Leakage	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V			±100	nA
ON CHARACTERISTICS[b]						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = -250μA	-1	-1.4	-3	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS} = -10V, I_D = -3.5A		60	100	mΩ
		V_{GS} = -4.5V, I_D = -2A		110	160	mΩ
On-State Drain Current	$I_{D(ON)}$	V_{DS} = -5V, V_{GS} = -10V	-14			A
Forward Transconductance	g_{FS}	V_{DS} = -15V, I_D = -3.5A	3	5		S
DYNAMIC CHARACTERISTICS[c]						
Input Capacitance	C_{ISS}	V_{DS} =-15V, V_{GS} = 0V f =1.0MHz		810		pF
Output Capacitance	C_{OSS}			350		pF
Reverse Transfer Capacitance	C_{RSS}			130		pF
SWITCHING CHARACTERISTICS[c]						
Turn-On Delay Time	$t_{D(ON)}$	V_{DD} = -15V, I_D = -1A, V_{GEN} = -10V, R_{GEN} = 6 Ω		20	28	ns
Rise Time	t_r			7	14	ns
Turn-Off Delay Time	$t_{D(OFF)}$			37	50	ns
Fall Time	t_f			23	32	ns
Total Gate Charge	Q_g	V_{DS} =-10V, I_D = -3.5A, V_{GS} =-10V		16	21	nC
Gate-Source Charge	Q_{gs}			2		nC
Gate-Drain Charge	Q_{gd}			4.5		nC

ELECTRICAL CHARACTERISTICS (T_A=25°C unless otherwise noted)

Parameter	Symbol	Condition		Min	Typ[c]	Max	Unit
DRAIN-SOURCE DIODE CHARACTERISTICS [b]							
Diode Forward Voltage	V_{SD}	V_{GS} = 0V, Is =1.7A	N-Ch		0.77	1.2	V
		V_{GS} = 0V, Is =-1.7A	P-Ch		-0.80	-1.2	

Notes

a.Surface Mounted on FR4 Board, t ≤10sec.
b.Pulse Test:Pulse Width ≤300 μ s, Duty Cycle ≤ 2%.
c.Guaranteed by design, not subject to production testing.

N-Channel

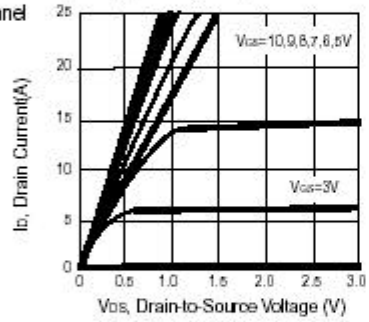


Figure 1. Output Characteristics

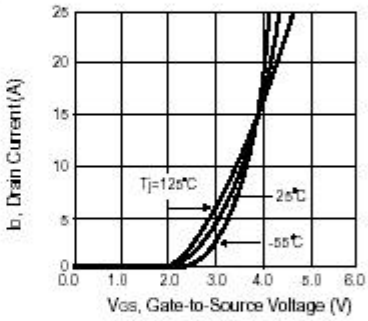


Figure 2. Transfer Characteristics

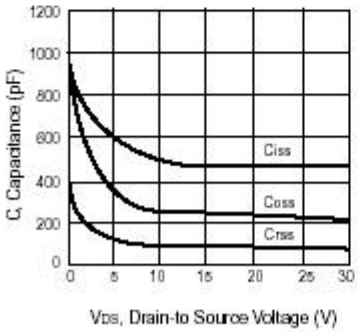


Figure 3. Capacitance

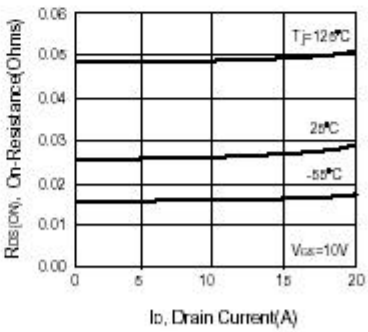


Figure 4. On-Resistance Variation with Drain Current and Temperature

N-Channel

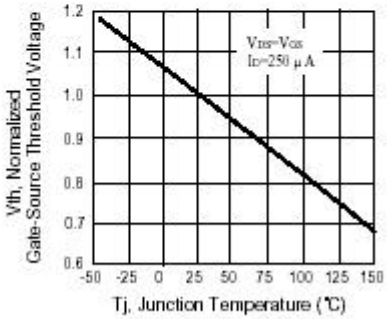


Figure 5. Gate Threshold Variation with Temperature

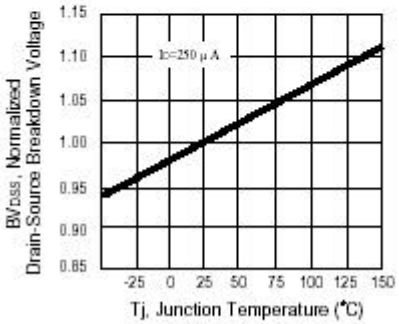


Figure 6. Breakdown Voltage Variationwith Temperature

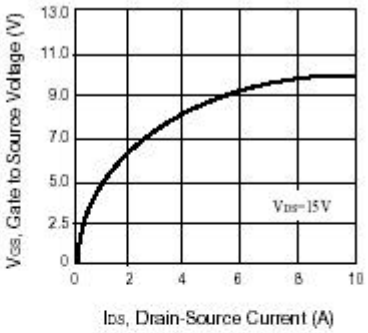


Figure 7. Transconductance Variation with Temperature

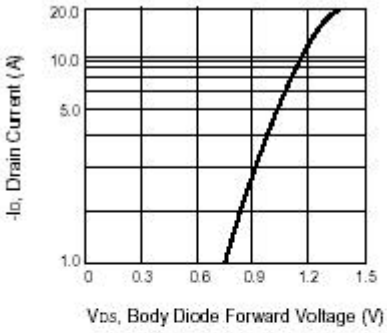


Figure 8. Body Diode Forward VoltageVariation with Source Current

P-Channel

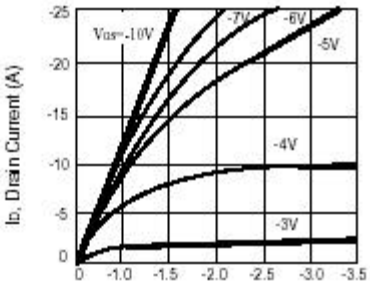


Figure 1. Output Characteristics

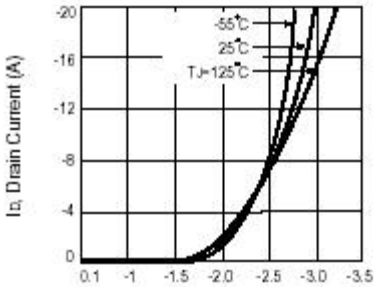


Figure 2. Transfer Characteristics

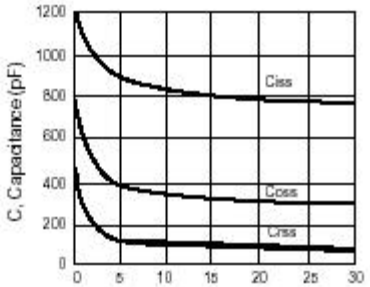


Figure 3. Capacitance

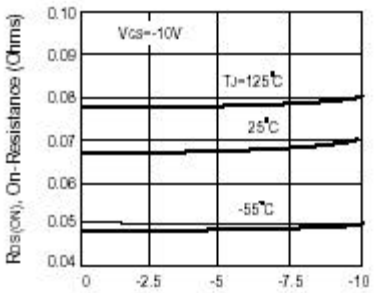


Figure 4. On-Resistance Variation withDrain Current and Temperature

P-Channel

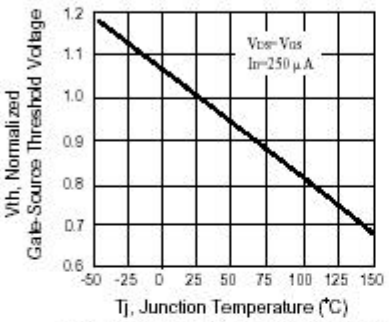


Figure 5. Gate Threshold Variation with Temperature

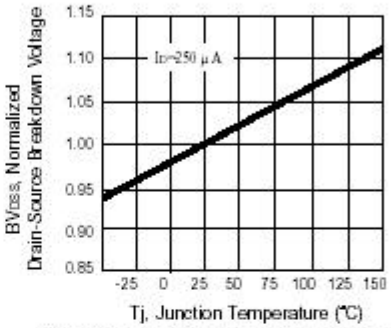


Figure 6. Breakdown Voltage Variation with Temperature

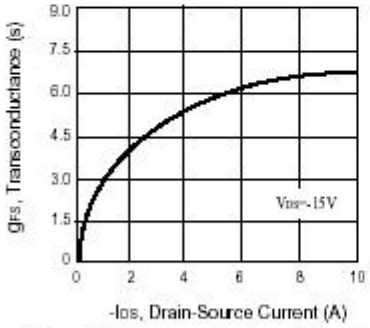


Figure 7. Transconductance Variation with Temperature

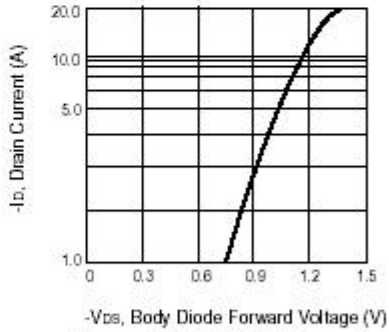


Figure 8. Body Diode Forward Voltage Variation with Source Current

N-Channel

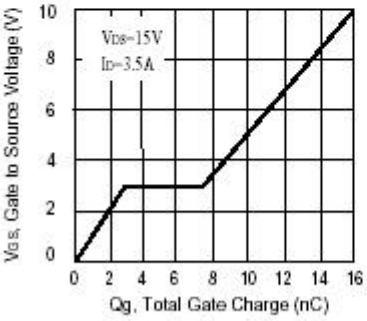


Figure 9. Gate Charge

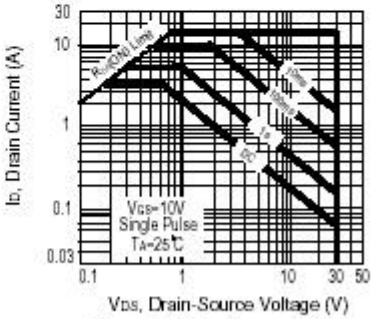


Figure 10. Maximum Safe Operating Area

P-Channel

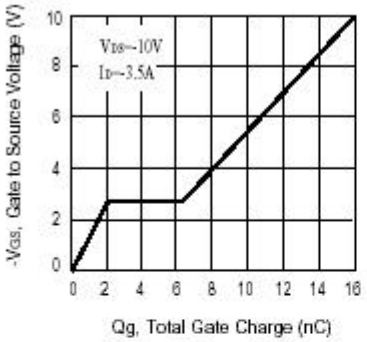


Figure 9. Gate Charge

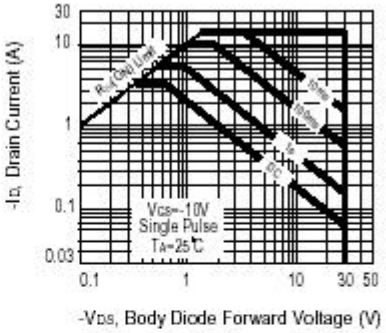


Figure 10. Maximum Safe Operating Area

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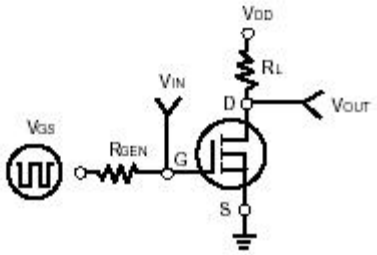

Figure 11. Switching Test Circuit

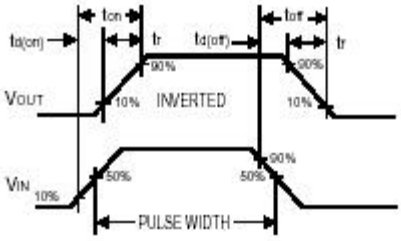

Figure 12. Switching Waveforms

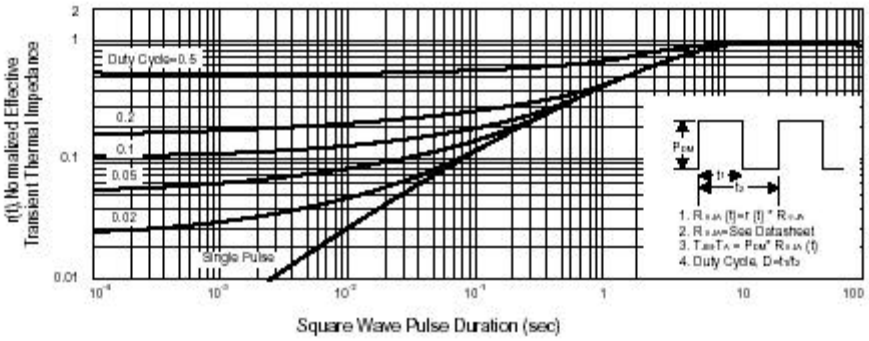

Figure 13. Normalized Thermal Transient Impedance Curve