CEM3109

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

FEATURES

■ 30V, 10A, $R_{DS(ON)}$ = 14mΩ @V_{GS} = 10V.
$R_{DS(ON)}$ = 20mΩ @V_{GS} = 4.5V.

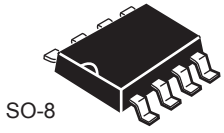
■ -30V, -8A, $R_{DS(ON)}$ = 20mΩ @V_{GS} = -10V.
$R_{DS(ON)}$ = 30mΩ @V_{GS} = -4.5V.

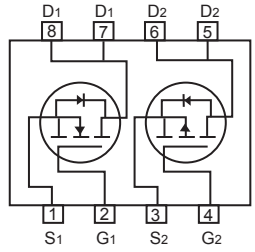
■ Super high dense cell design for extremely low $R_{DS(ON)}$.

■ High power and current handing capability.

■ Lead free product is acquired.

■ Surface mount Package.





ABSOLUTE MAXIMUM RATINGS T_A = 25°C unless otherwise noted

Parameter	Symbol	Channel 1	Channel 2	Units
Drain-Source Voltage	V_{DS}	30	-30	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Drain Current-Continuous	I_D	10	-8	A
Drain Current-Pulsed [a]	I_{DM}	40	32	A
Maximum Power Dissipation	P_D	2.0		W
Operating and Store Temperature Range	T_J,T_{stg}	-55 to 150		°C

Thermal Characteristics

Parameter	Symbol	Limit	Units
Thermal Resistance, Junction-to-Ambient [b]	$R_{\theta JA}$	62.5	°C/W

This is preliminary information on a new product in development now .
Details are subject to change without notice .

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N-Channel(Q1) Electrical Characteristics $T_A = 25^{\circ}C$ unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
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} = 30V, V_{GS} = 0V			1	μA
Gate Body Leakage Current, Forward	I_{GSSF}	V_{GS} = 20V, V_{DS} = 0V			100	nA
Gate Body Leakage Current, Reverse	I_{GSSR}	V_{GS} = -20V, V_{DS} = 0V			-100	nA
On Characteristics [b]						
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS} = V_{DS}, I_D = 250μA	1		3	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 9A		11	14	mΩ
		V_{GS} = 4.5V, I_D = 5A		18	20	mΩ
Dynamic Characteristics [c]						
Input Capacitance	C_{iss}	V_{DS} = 25V, V_{GS} = 0V, f = 1.0 MHz		905		pF
Output Capacitance	C_{oss}			170		pF
Reverse Transfer Capacitance	C_{rss}			125		pF
Switching Characteristics [c]						
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15V, I_D = 1A, V_{GS} = 10V, R_{GEN} = 4Ω		13	26	ns
Turn-On Rise Time	t_r			6	12	ns
Turn-Off Delay Time	$t_{d(off)}$			33	66	ns
Turn-Off Fall Time	t_f			5	10	ns
Total Gate Charge	Q_g	V_{DS} = 24V, I_D = 9A, V_{GS} = 4.5V		12.2	16.2	nC
Gate-Source Charge	Q_{gs}			2.4		nC
Gate-Drain Charge	Q_{gd}			7.2		nC
Drain-Source Diode Characteristics and Maximun Ratings						
Drain-Source Diode Forward Current	I_S				1.5	A
Drain-Source Diode Forward Voltage [b]	V_{SD}	V_{GS} = 0V, I_S = 1.5A			1.2	V

Notes :
a.Repetitive Rating : Pulse width limited by maximum junction temperature.
b.Pulse Test : Pulse Width < 300μs, Duty Cycle < 2%.
c.Guaranteed by design, not subject to production testing.

P-Channel Electrical Characteristics [a] T_A = 25 C unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
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} = -30V, V_{GS} = 0V			-1	μA
Gate Body Leakage Current, Forward	I_{GSSF}	V_{GS} = 20V, V_{DS} = 0V			100	nA
Gate Body Leakage Current, Reverse	I_{GSSR}	V_{GS} = -20V, V_{DS} = 0V			-100	nA
On Characteristics [b]						
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS} = V_{DS}, I_D = -250μA	-1		-3	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = -10V, I_D = -8A		15	20	mΩ
		V_{GS} = -4.5V, I_D = -4A		22	30	mΩ
Dynamic Characteristics [c]						
Input Capacitance	C_{iss}	V_{DS} = -25V, V_{GS} = 0V, f = 1.0 MHz		1770		pF
Output Capacitance	C_{oss}			255		pF
Reverse Transfer Capacitance	C_{rss}			180		pF
Switching Characteristics [c]						
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = -15V, I_D = -1A, V_{GS} = -10V, R_{GEN} = 4Ω		16	32	ns
Turn-On Rise Time	t_r			6	12	ns
Turn-Off Delay Time	$t_{d(off)}$			52	104	ns
Turn-Off Fall Time	t_f			9	18	ns
Total Gate Charge	Q_g	V_{DS} = -24V, I_D = -8A, V_{GS} = -4.5V		18.9	25.1	nC
Gate-Source Charge	Q_{gs}			5.1		nC
Gate-Drain Charge	Q_{gd}			9.4		nC
Drain-Source Diode Characteristics and Maximun Ratings						
Drain-Source Diode Forward Current	I_S				-1.5	A
Drain-Source Diode Forward Voltage [b]	V_{SD}	V_{GS} = 0V, I_S = -1.5A			-1.2	V

Notes :
a.Repetitive Rating : Pulse width limited by maximum junction temperature.
b.Pulse Test : Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
c.Guaranteed by design, not subject to production testing.

N-CHANNEL

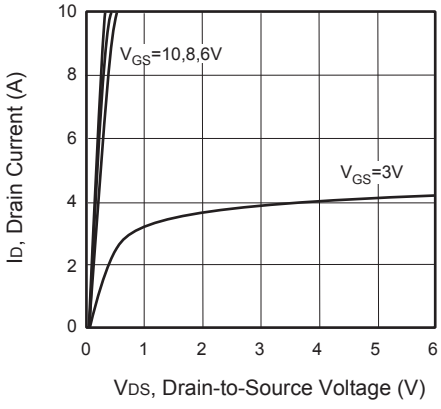

Figure 1. Output Characteristics

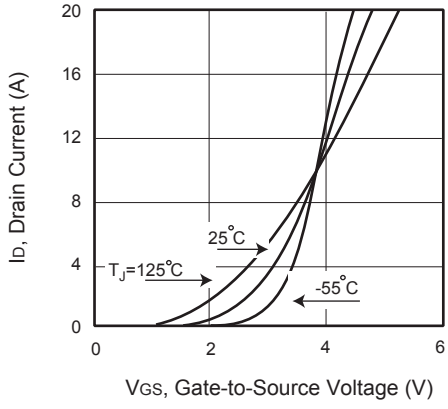

Figure 2. Transfer Characteristics

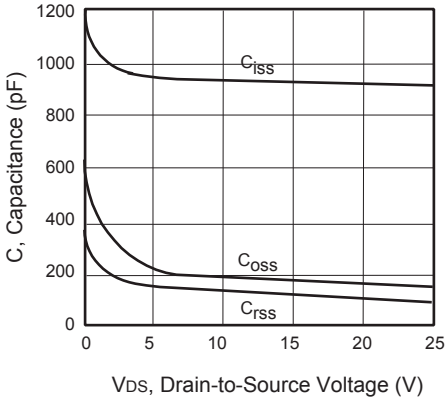

Figure 3. Capacitance

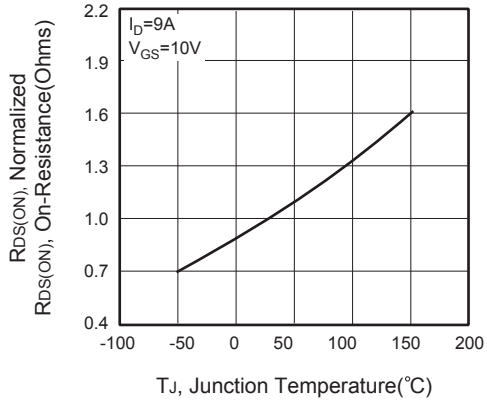

Figure 4. On-Resistance Variation with Temperature

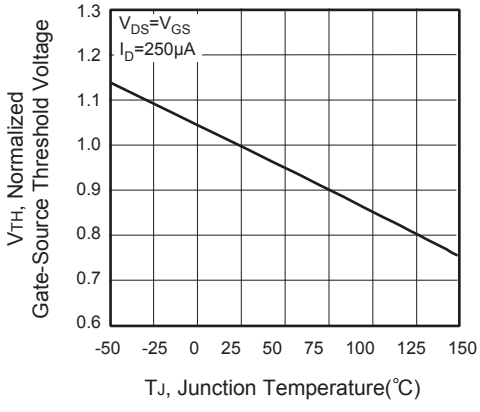

Figure 5. Gate Threshold Variation with Temperature

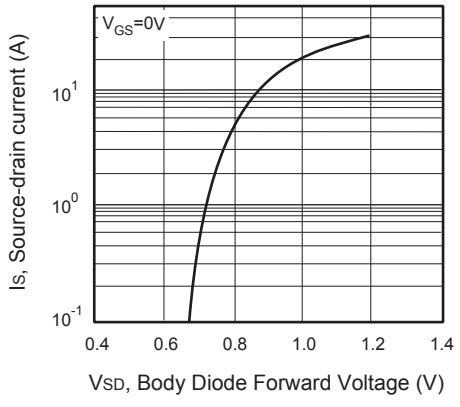

Figure 6. Body Diode Forward Voltage Variation with Source Current

P-CHANNEL

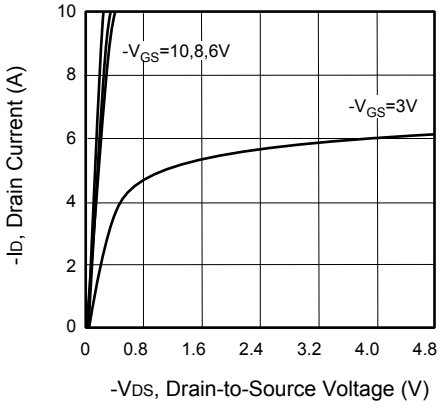

Figure 1. Output Characteristics

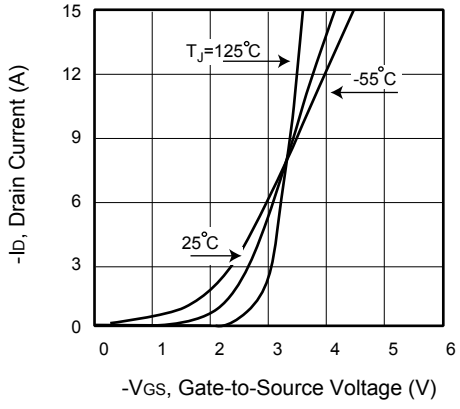

Figure 2. Transfer Characteristics

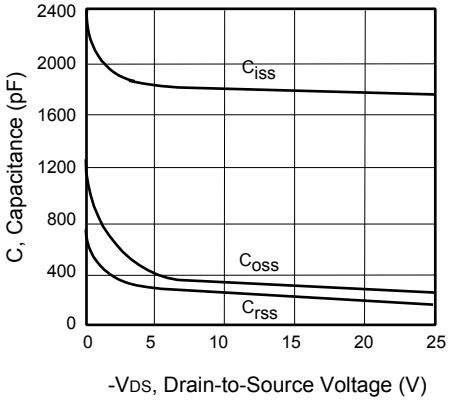

Figure 3. Capacitance

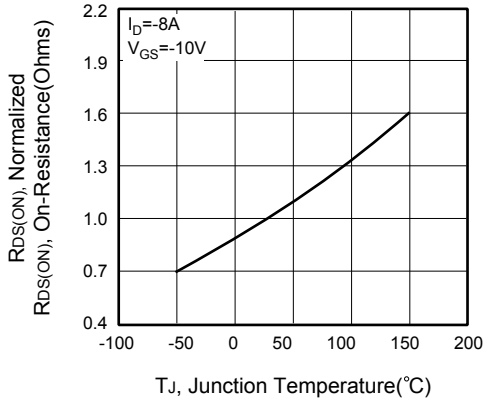

Figure 4. On-Resistance Variation with Temperature

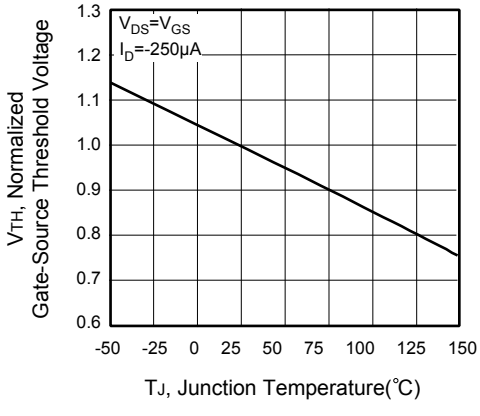

Figure 5. Gate Threshold Variation with Temperature

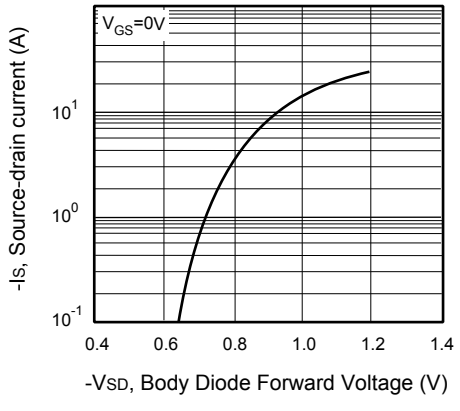

Figure 6. Body Diode Forward Voltage Variation with Source Current

N-CHANNEL

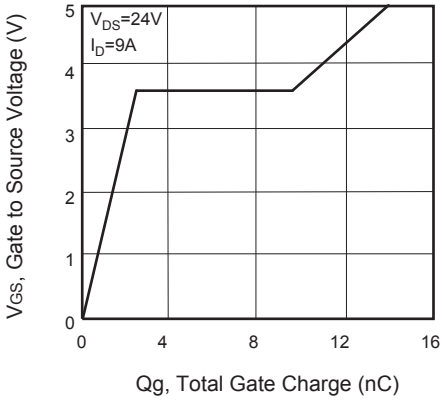

Figure 13. Gate Charge

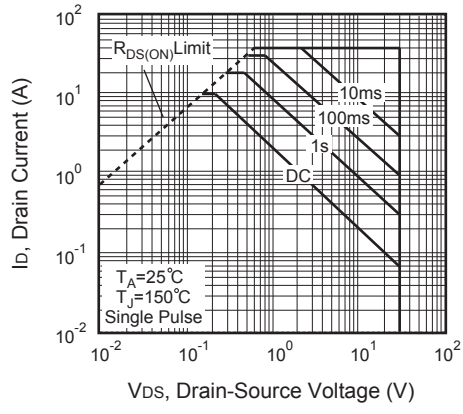

Figure 14. Maximum Safe Operating Area

P-CHANNEL

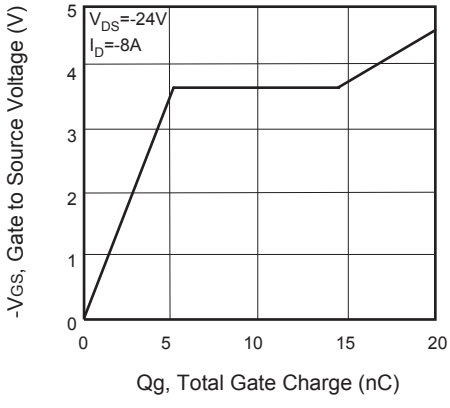

Figure 15. Gate Charge

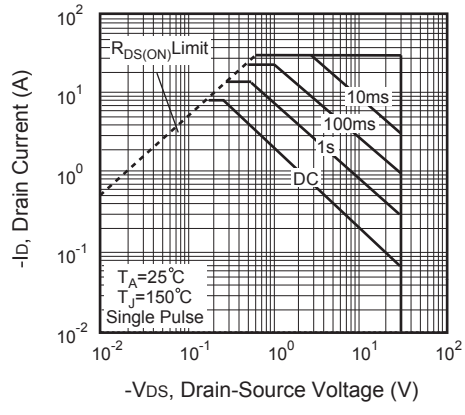

Figure 16. Maximum Safe Operating Area

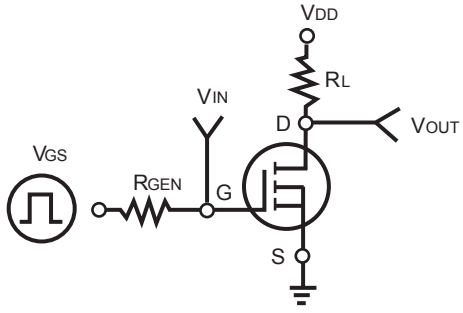

Figure 17. Switching Test Circuit

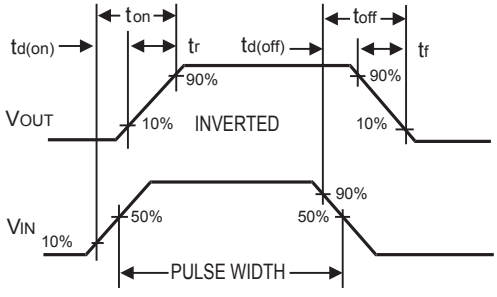

Figure 18. Switching Waveforms

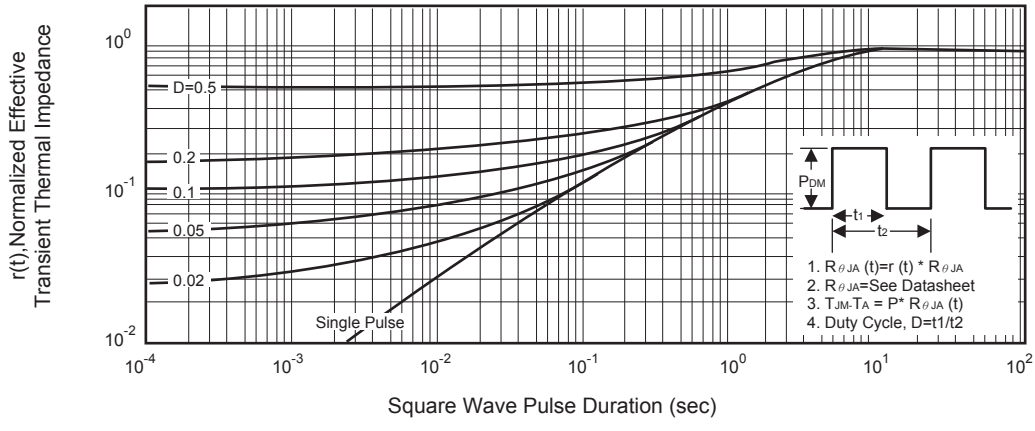

Figure 19. Normalized Thermal Transient Impedance Curve