CEM2239

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

5

FEATURES

■ 20V, 7.6A, $R_{DS(ON)}$ = 22mΩ @V_{GS} = 4.5V.
$R_{DS(ON)}$ = 32mΩ @V_{GS} = 2.5V.

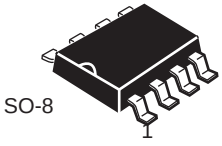
■ -20V, -5.9A, $R_{DS(ON)}$ = 35mΩ @V_{GS} = -4.5V.
$R_{DS(ON)}$ = 50mΩ @V_{GS} = -2.5V.

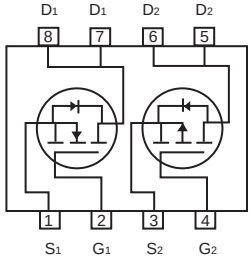
■ Super high dense cell design for extremely low $R_{DS(ON)}$.

■ 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	N-Channel	P-Channel	Units
Drain-Source Voltage	V_{DS}	20	-20	V
Gate-Source Voltage	V_{GS}	±12	±12	V
Drain Current-Continuous	I_D	7.6	-5.9	A
Drain Current-Pulsed [a]	I_{DM}	30	25	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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http://www.cetsemi.com

N-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	20			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20V, V_{GS} = 0V			1	μA
Gate Body Leakage Current, Forward	I_{GSSF}	V_{GS} = 12V, V_{DS} = 0V			100	nA
Gate Body Leakage Current, Reverse	I_{GSSR}	V_{GS} = -12V, V_{DS} = 0V			-100	nA
On Characteristics [c]						
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS} = V_{DS}, I_D = 250μA	0.5		1.2	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 4.5V, I_D = 7.6A		17	22	mΩ
		V_{GS} = 2.5V, I_D = 6.1A		24	32	mΩ
Dynamic Characteristics [d]						
Forward Transconductance	g_{FS}	V_{DS} = 5V, I_D = 7.6A		19		S
Input Capacitance	C_{iss}	V_{DS} = 8V, V_{GS} = 0V, f = 1.0 MHz		1565		pF
Output Capacitance	C_{oss}			360		pF
Reverse Transfer Capacitance	C_{rss}			255		pF
Switching Characteristics [d]						
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 10V, I_D = 1A, V_{GS} = 4.5V, R_{GEN} = 6Ω		15	30	ns
Turn-On Rise Time	t_r			11	22	ns
Turn-Off Delay Time	$t_{d(off)}$			47	94	ns
Turn-Off Fall Time	t_f			20	40	ns
Total Gate Charge	Q_g	V_{DS} = 10V, I_D = 6A, V_{GS} = 4.5V		16	22	nC
Gate-Source Charge	Q_{gs}			2.4		nC
Gate-Drain Charge	Q_{gd}			5.0		nC
Drain-Source Diode Characteristics and Maximun Ratings						
Drain-Source Diode Forward Current [b]	I_S				7.6	A
Drain-Source Diode Forward Voltage [c]	V_{SD}	V_{GS} = 0V, I_S = 1A			1.2	V

Notes :
a.Repetitive Rating : Pulse width limited by maximum junction temperature.
b.Surface Mounted on FR4 Board, t ≤ 10 sec.
c.Pulse Test : Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
d.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	-20			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = -20V, V_{GS} = 0V			-1	µA
Gate Body Leakage Current, Forward	I_{GSSF}	V_{GS} = 12V, V_{DS} = 0V			100	nA
Gate Body Leakage Current, Reverse	I_{GSSR}	V_{GS} = -12V, V_{DS} = 0V			-100	nA
On Characteristics [b]						
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS} = V_{DS}, I_D = -250µA	-0.5		-1.2	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = -4.5V, I_D = -5.9A		28	35	mΩ
		V_{GS} = -2.5V, I_D = -4.7A		38	50	mΩ
Dynamic Characteristics [c]						
Forward Transconductance	g_{FS}	V_{DS} = -1.8V, I_D = -5.9A		41		S
Input Capacitance	C_{iss}	V_{DS} = -15V, V_{GS} = 0V, f = 1.0 MHz		2030		pF
Output Capacitance	C_{oss}			300		pF
Reverse Transfer Capacitance	C_{rss}			195		pF
Switching Characteristics [c]						
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = -10V, I_D = -1A, V_{GS} = -4.5V, R_{GEN} = 24Ω		11	22	ns
Turn-On Rise Time	t_r			9	18	ns
Turn-Off Delay Time	$t_{d(off)}$			355	710	ns
Turn-Off Fall Time	t_f			109	218	ns
Total Gate Charge	Q_g	V_{DS} = -16V, I_D = -4.7A, V_{GS} = -4.5V		19	25	nC
Gate-Source Charge	Q_{gs}			4.4		nC
Gate-Drain Charge	Q_{gd}			2.7		nC
Drain-Source Diode Characteristics and Maximun Ratings						
Drain-Source Diode Forward Current	I_S				-5.9	A
Drain-Source Diode Forward Voltage [b]	V_{SD}	V_{GS} = 0V, I_S = -2.1A			-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

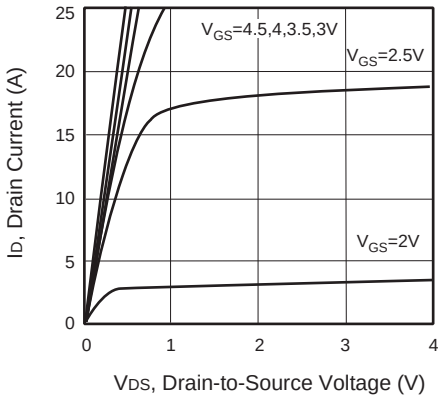


Figure 1. Output Characteristics

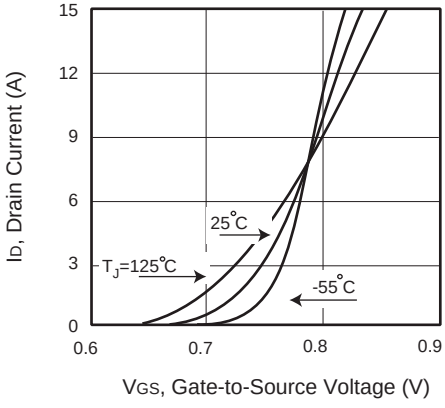


Figure 2. Transfer Characteristics

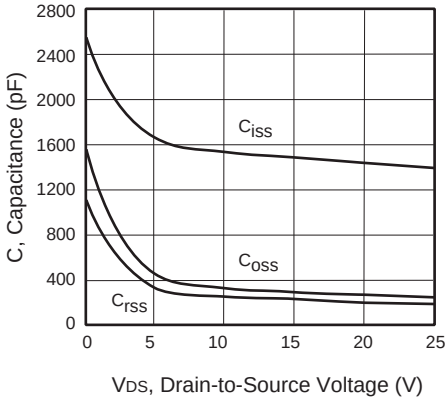


Figure 3. Capacitance

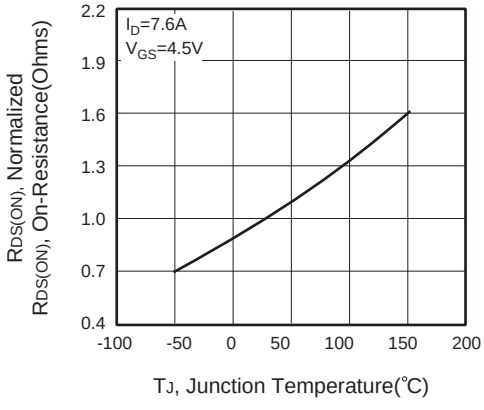


Figure 4. On-Resistance Variation with Temperature

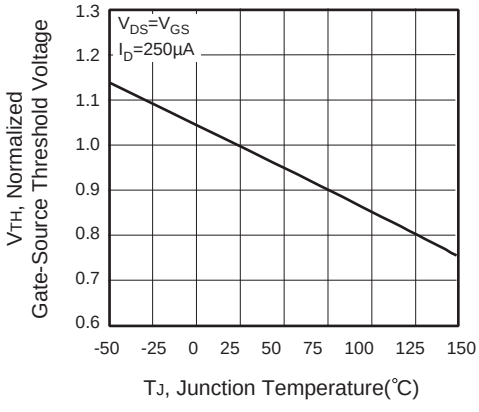


Figure 5. Gate Threshold Variation with Temperature

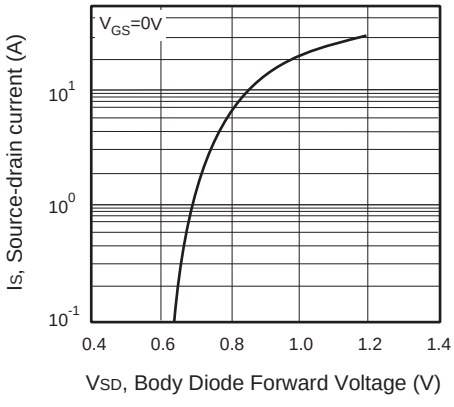
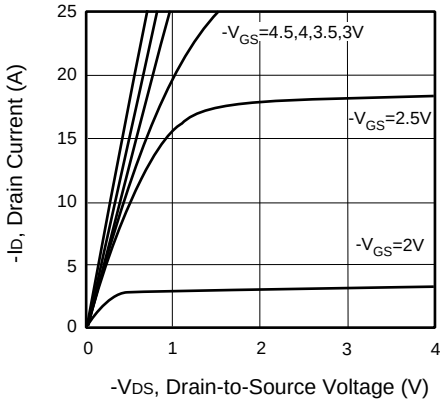


Figure 6. Body Diode Forward Voltage Variation with Source Current

P-CHANNEL



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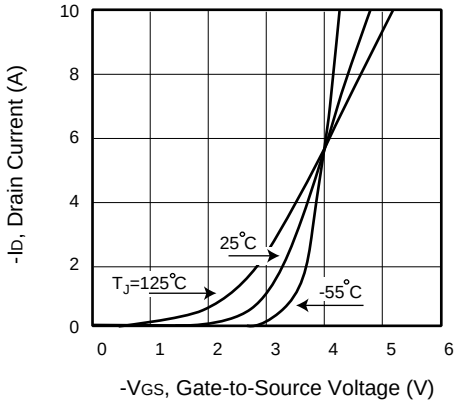
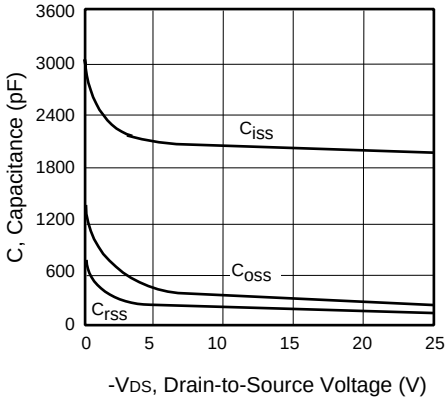


Figure 2. Transfer Characteristics



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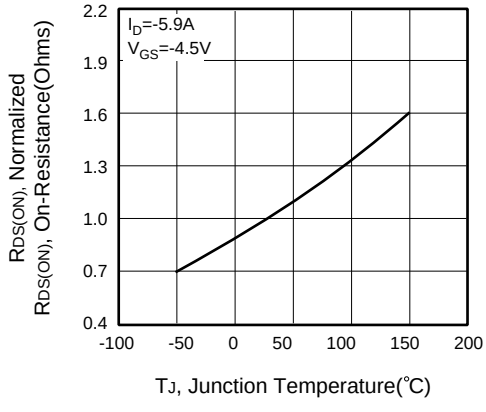

Figure 4. On-Resistance Variation with Temperature

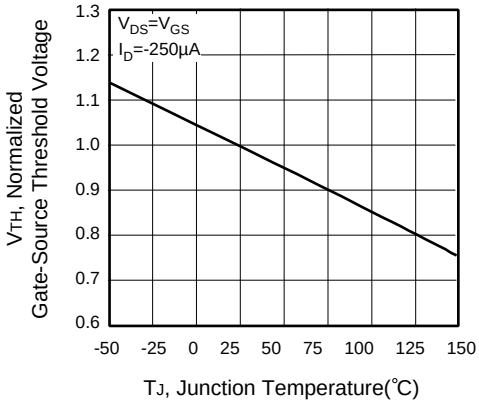

Figure 5. Gate Threshold Variation with Temperature

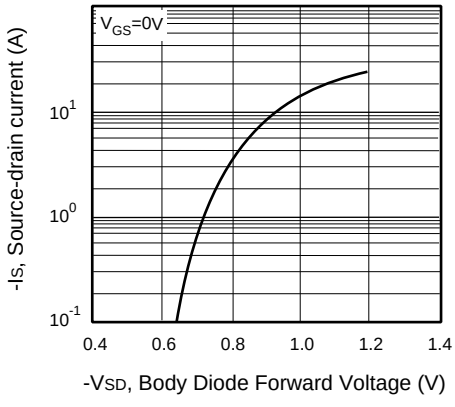

Figure 6. Body Diode Forward Voltage Variation with Source Current

N-CHANNEL

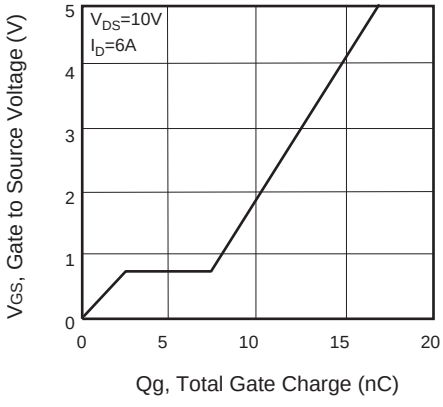

Figure 13. Gate Charge

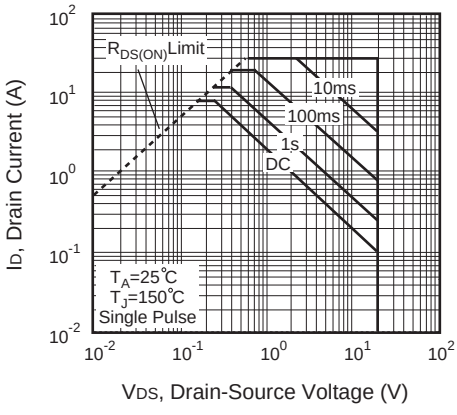

Figure 14. Maximum Safe Operating Area

P-CHANNEL

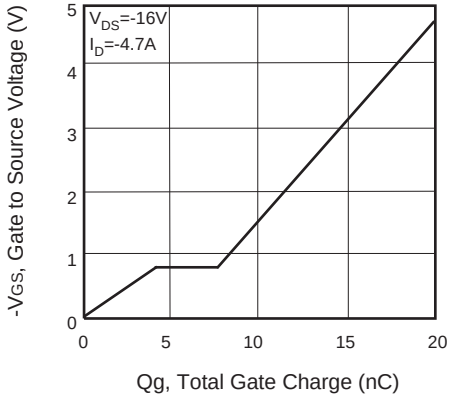

Figure 15. Gate Charge

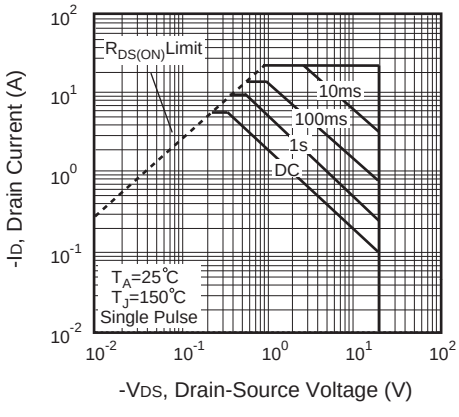

Figure 16. Maximum Safe Operating Area

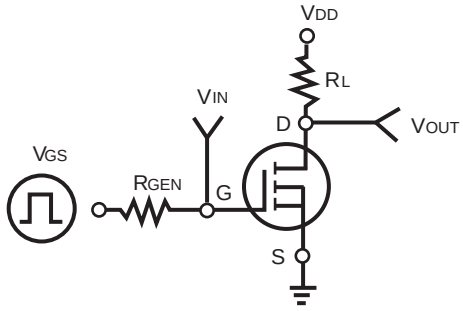

Figure 17. Switching Test Circuit

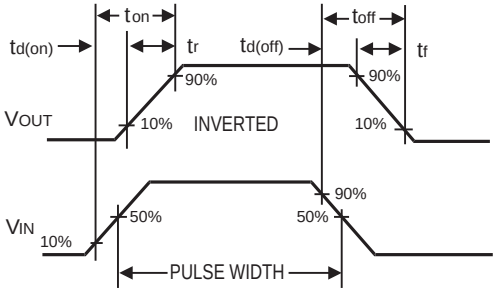

Figure 18. Switching Waveforms

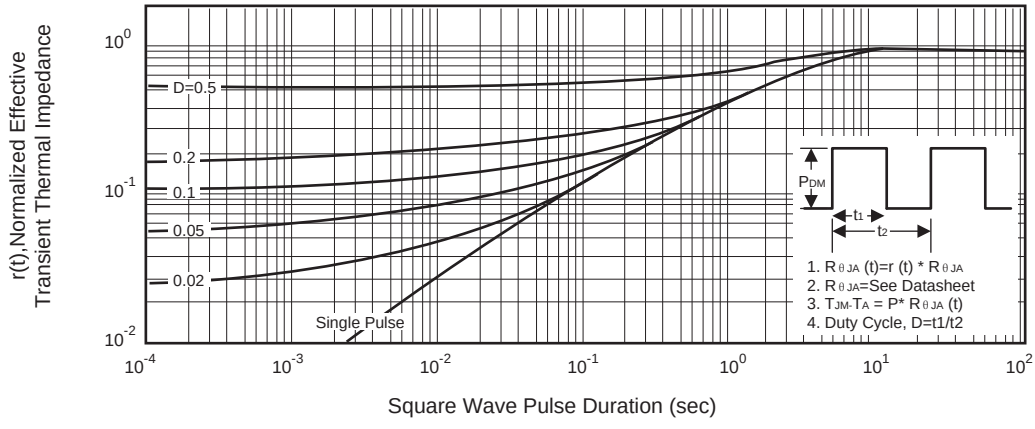

Figure 19. Normalized Thermal Transient Impedance Curve