CEM2539A

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

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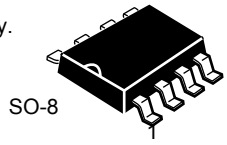
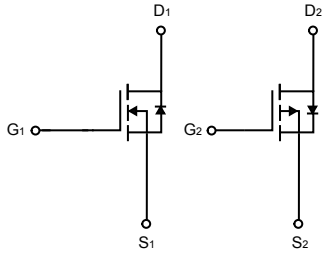
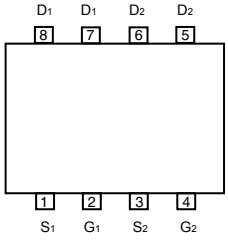
FEATURES

- 20V, 7.5A, $R_{DS(ON)}$ = 22mΩ @V_{GS} = 10V.
  $R_{DS(ON)}$ = 25mΩ @V_{GS} = 4.5V.
  $R_{DS(ON)}$ = 40mΩ @V_{GS} = 2.5V.
- -20V, -4A, $R_{DS(ON)}$ = 80mΩ @V_{GS} = -10V.
  $R_{DS(ON)}$ = 100mΩ @V_{GS} = -4.5V.
  $R_{DS(ON)}$ = 150mΩ @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.


SO-8





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	7.5	-4.0	A
Drain Current-Pulsed [a]	I_{DM}	30	-16	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

N-Channel Electrical Characteristics 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	0.6		2	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} =10V, I_D = 7.3A		18	22	mΩ
		V_{GS} = 4.5V, I_D = 6.4A		20	25	mΩ
		V_{GS} = 2.5V, I_D = 4.5A		26	40	mΩ
Dynamic Characteristics [d]						
Input Capacitance	C_{iss}	V_{DS} = 8V, V_{GS} = 0V, f = 1.0 MHz		910		pF
Output Capacitance	C_{oss}			230		pF
Reverse Transfer Capacitance	C_{rss}			165		pF
Switching Characteristics [d]						
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 10V, I_D = 1A, V_{GS} = 4.5V, R_{GEN} = 6Ω		13	26	ns
Turn-On Rise Time	t_r			9.5	19	ns
Turn-Off Delay Time	$t_{d(off)}$			34	68	ns
Turn-Off Fall Time	t_f			10	20	ns
Total Gate Charge	Q_g	V_{DS} = 10V, I_D =6A, V_{GS} = 4.5V		10	13	nC
Gate-Source Charge	Q_{gs}			1.4		nC
Gate-Drain Charge	Q_{gd}			3.1		nC
Drain-Source Diode Characteristics and Maximun Ratings						
Drain-Source Diode Forward Current [b]	I_S				7.5	A
Drain-Source Diode Forward Voltage [c]	V_{SD}	V_{GS} = 0V, I_S = 1A			1	V

Notes :
a.Repetitive Rating : Pulse width limited by maximum junction temperature.
b.Surface Mounted on FR4 Board, t < 5 sec.
c.Pulse Test : Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
d.Guaranteed by design, not subject to production testing.

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P-Channel Electrical Characteristics 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	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = -10V, I_D = -3.5A		70	80	mΩ
		V_{GS} = -4.5V, I_D = -2.8A		80	100	mΩ
		V_{GS} = -2.5V, I_D = -2.0A		90	150	mΩ
Dynamic Characteristics [d]						
Forward Transconductance	g_{FS}	V_{DS} = -5V, I_D = -3.5A		10		S
Input Capacitance	C_{iss}	V_{DS} = -10V, V_{GS} = 0V, f = 1.0 MHz		1180		pF
Output Capacitance	C_{oss}			235		pF
Reverse Transfer Capacitance	C_{rss}			125		pF
Switching Characteristics [d]						
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = -10V, I_D = -4A, V_{GS} = -4.5V, R_{GEN} = 3Ω		14.6	29.2	ns
Turn-On Rise Time	t_r			9.2	18.4	ns
Turn-Off Delay Time	$t_{d(off)}$			73	146	ns
Turn-Off Fall Time	t_f			36	72	ns
Total Gate Charge	Q_g	V_{DS} = -10V, I_D = -3.7A, V_{GS} = -4.5V		10.8	14.3	nC
Gate-Source Charge	Q_{gs}			1.7		nC
Gate-Drain Charge	Q_{gd}			2.7		nC
Drain-Source Diode Characteristics and Maximun Ratings						
Drain-Source Diode Forward Current [b]	I_S				-3.7	A
Drain-Source Diode Forward Voltage [c]	V_{SD}	V_{GS} = 0V, I_S = -1A			-1	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.

N-CHANNEL

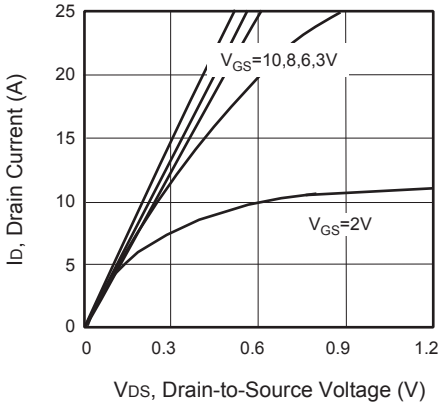

Figure 1. Output Characteristics

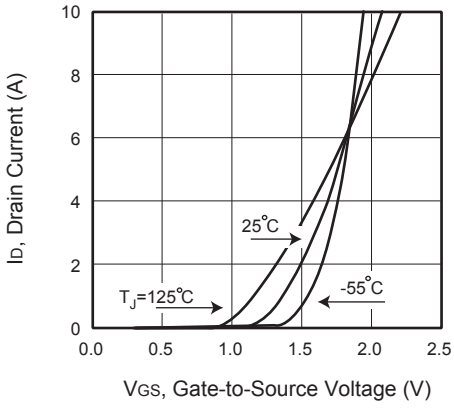

Figure 2. Transfer Characteristics

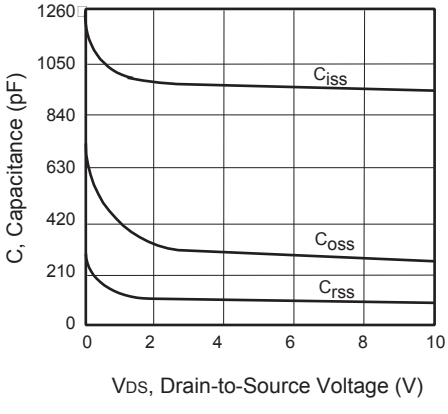

Figure 3. Capacitance

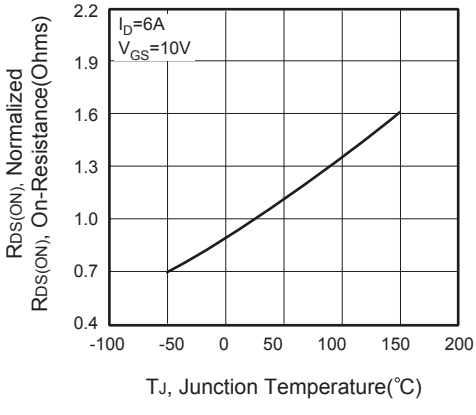

Figure 4. On-Resistance Variation with Temperature

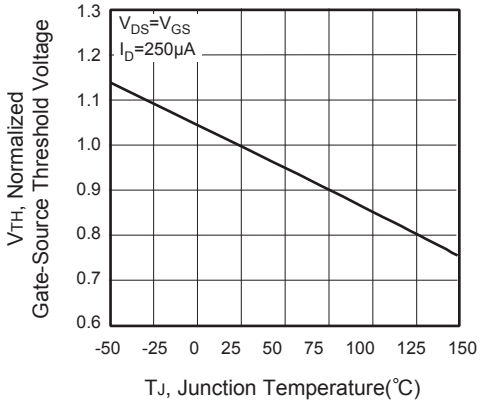

Figure 5. Gate Threshold Variation with Temperature

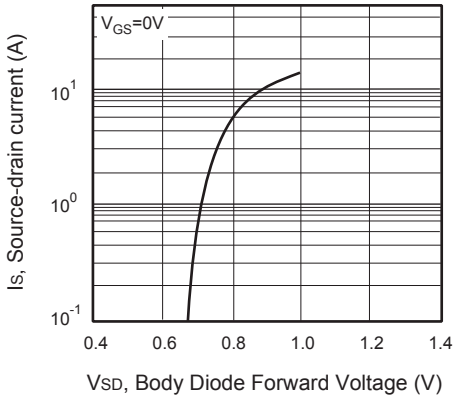

Figure 6. Body Diode Forward Voltage Variation with Source Current

P-CHANNEL

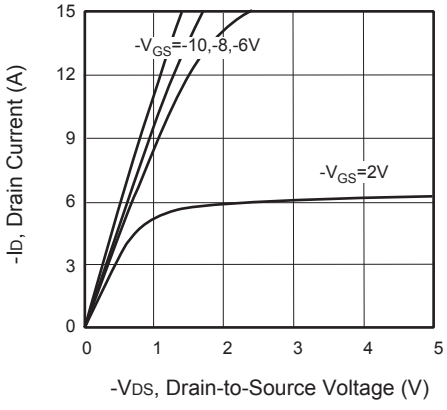

Figure 7. Output Characteristics

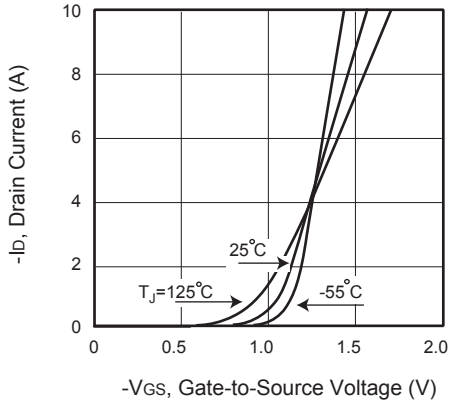

Figure 8. Transfer Characteristics

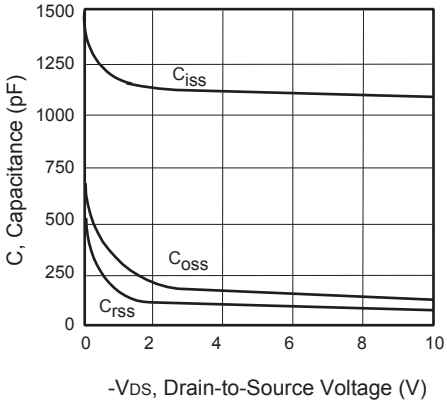

Figure 9. Capacitance

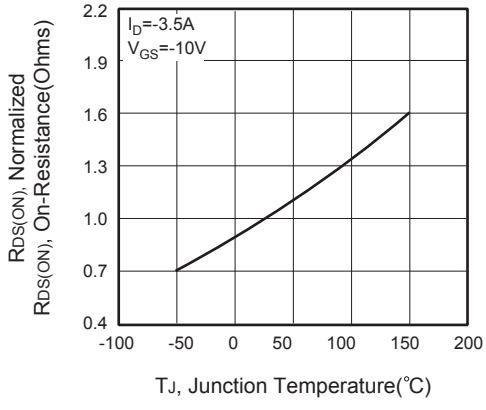

Figure 10. On-Resistance Variation with Temperature

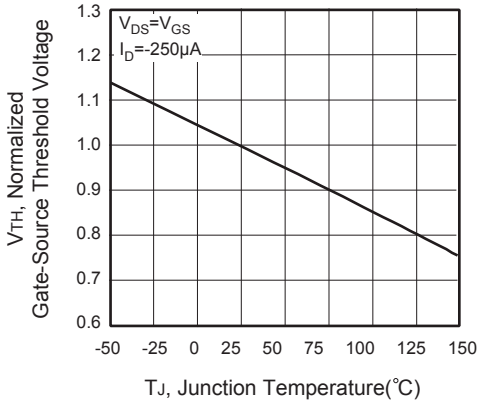

Figure 11. Gate Threshold Variation with Temperature

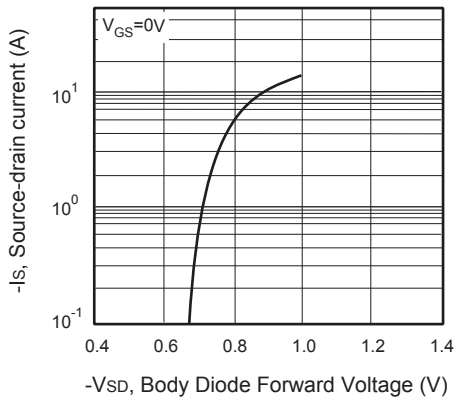

Figure 12. Body Diode Forward Voltage Variation with Source Current

N-CHANNEL

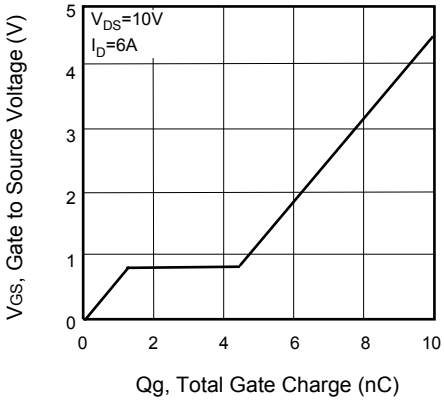

Figure 13. Gate Charge

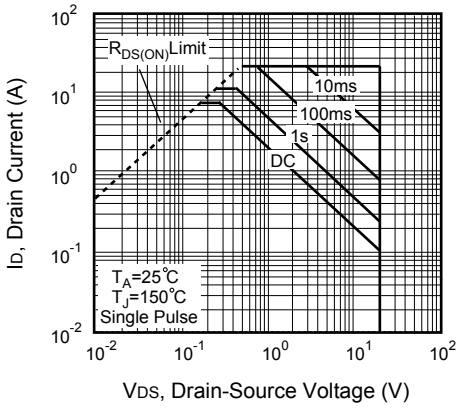

Figure 14. Maximum Safe Operating Area

P-CHANNEL

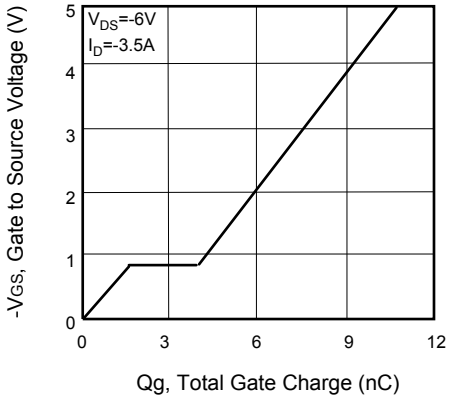

Figure 15. Gate Charge

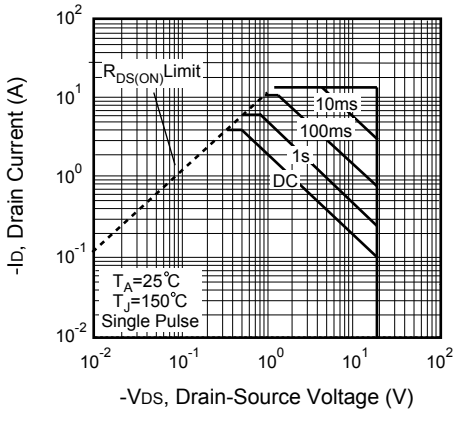

Figure 16. Maximum Safe Operating Area

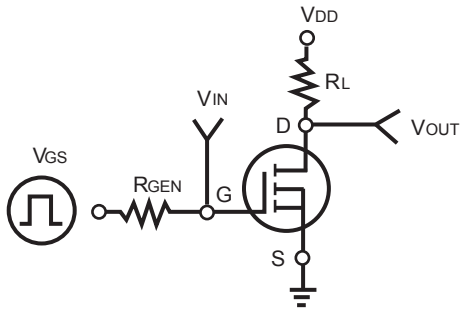

Figure 17. Switching Test Circuit

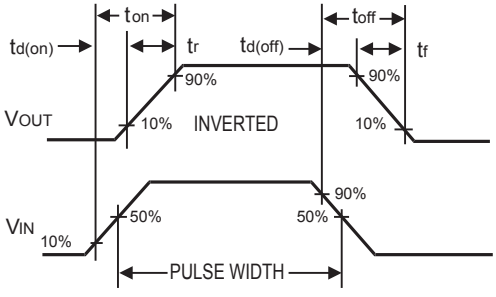

Figure 18. Switching Waveforms

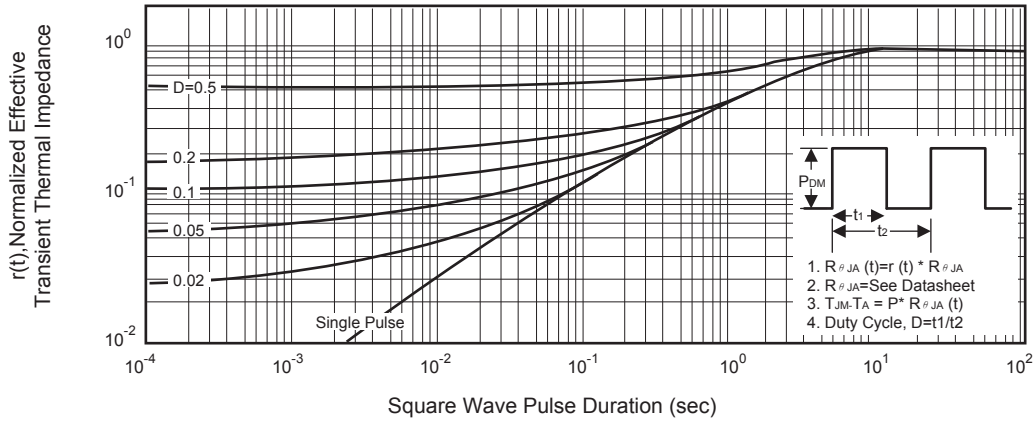

Figure 19. Normalized Thermal Transient Impedance Curve