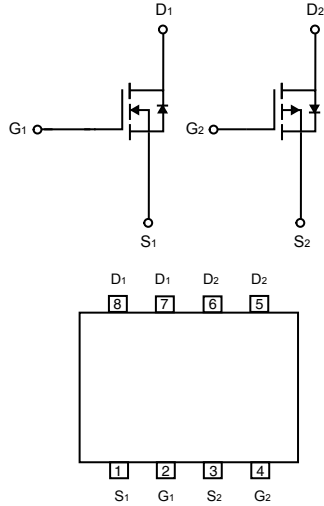
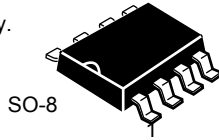


Dual Enhancement Mode Field Effect Transistor (N and P Channel)

FEATURES

- 20V, 7.5A, $R_{DS(ON)} = 22m\Omega$ @ $V_{GS} = 10V$.
 $R_{DS(ON)} = 25m\Omega$ @ $V_{GS} = 4.5V$.
 $R_{DS(ON)} = 40m\Omega$ @ $V_{GS} = 2.5V$.
- -20V, -4A, $R_{DS(ON)} = 80m\Omega$ @ $V_{GS} = -10V$.
 $R_{DS(ON)} = 100m\Omega$ @ $V_{GS} = -4.5V$.
 $R_{DS(ON)} = 150m\Omega$ @ $V_{GS} = -2.5V$.
- Super high dense cell design for extremely low $R_{DS(ON)}$.
- High power and current handling capability.
- Lead free product is acquired.
- Surface mount Package.



5

ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ C$ 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		$^\circ C$

Thermal Characteristics

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



CEM2539A

N-Channel Electrical Characteristics $T_A = 25\text{ C}$ unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	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	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	0.6		2	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 7.3A$		18	22	$m\Omega$
		$V_{GS} = 4.5V, I_D = 6.4A$		20	25	$m\Omega$
		$V_{GS} = 2.5V, I_D = 4.5A$		26	40	$m\Omega$
Dynamic Characteristics ^d						
Input Capacitance	C_{iss}	$V_{DS} = 8V, V_{GS} = 0V,$ $f = 1.0\text{ MHz}$		910		pF
Output Capacitance	C_{oss}			230		pF
Reverse Transfer Capacitance	C_{rss}			165		pF
Switching Characteristics ^d						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10V, I_D = 1A,$ $V_{GS} = 4.5V, R_{GEN} = 6\Omega$		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 Maximum 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 : <input type="checkbox"/> a.Repetitive Rating : Pulse width limited by maximum junction temperature. <input type="checkbox"/> b.Surface Mounted on FR4 Board, $t < 5\text{ sec.}$ <input type="checkbox"/> c.Pulse Test : Pulse Width $\leq 300\mu s,$ Duty Cycle $\leq 2\%.$ <input type="checkbox"/> d.Guaranteed by design, not subject to production testing. <input type="checkbox"/> <input type="checkbox"/>						

7



CEM2539A

P-Channel Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = -250\mu A$	-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	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = -250\mu A$	-0.5		-1	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -3.5A$		70	80	$m\Omega$
		$V_{GS} = -4.5V, I_D = -2.8A$		80	100	$m\Omega$
		$V_{GS} = -2.5V, I_D = -2.0A$		90	150	$m\Omega$
Dynamic Characteristics^d						
Forward Transconductance	g_{FS}	$V_{DS} = -5V, I_D = -3.5A$		10		S
Input Capacitance	C_{iss}	$V_{DS} = -10V, V_{GS} = 0V,$ $f = 1.0\text{ MHz}$		1180		pF
Output Capacitance	C_{oss}			235		pF
Reverse Transfer Capacitance	C_{rss}			125		pF
Switching Characteristics^d						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10V, I_D = -4A,$ $V_{GS} = -4.5V, R_{GEN} = 3\Omega$		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 Maximum 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, $t \leq 10\text{ sec.}$ □ c.Pulse Test : Pulse Width $\leq 300\mu s,$ Duty Cycle $\leq 2\%.$ □ d.Guaranteed by design, not subject to production testing.□ □						



CEM2539A

N-CHANNEL

5

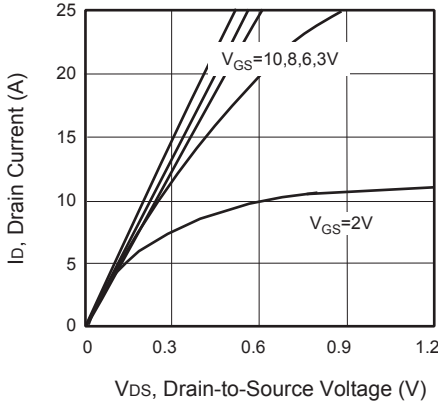


Figure 1. Output Characteristics

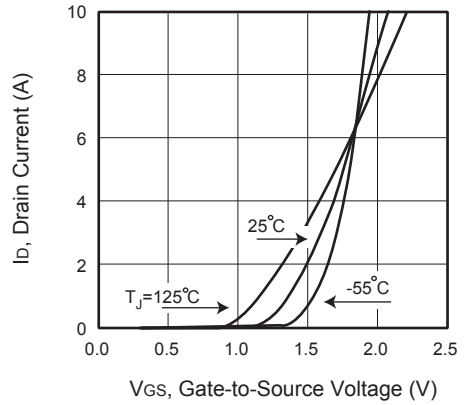


Figure 2. Transfer Characteristics

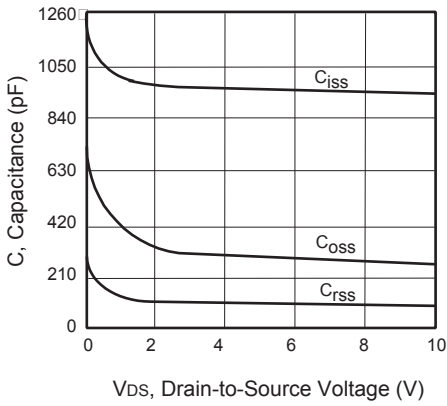


Figure 3. Capacitance

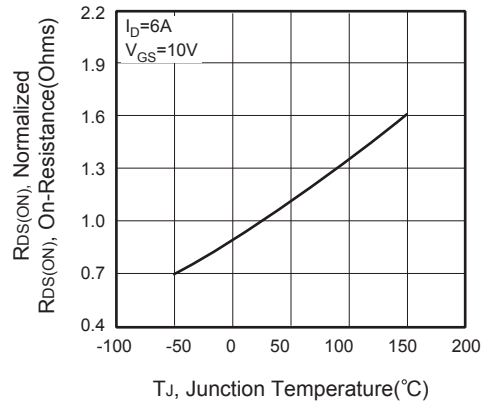


Figure 4. On-Resistance Variation with Temperature

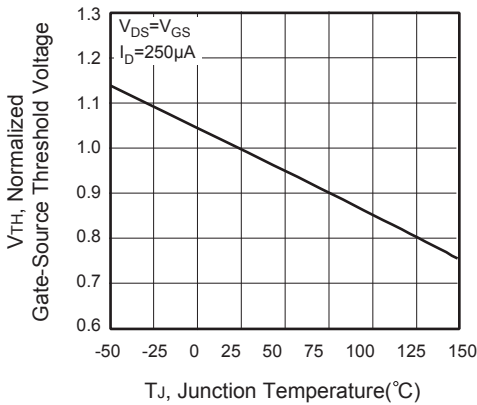


Figure 5. Gate Threshold Variation with Temperature

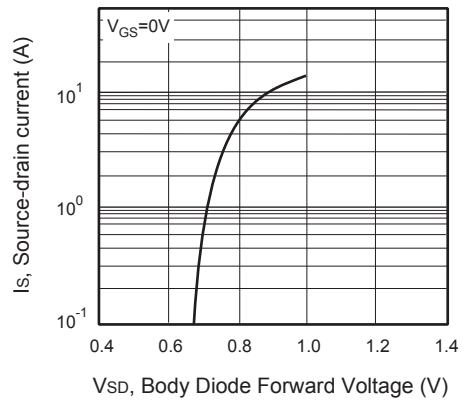


Figure 6. Body Diode Forward Voltage Variation with Source Current



CEM2539A

P-CHANNEL

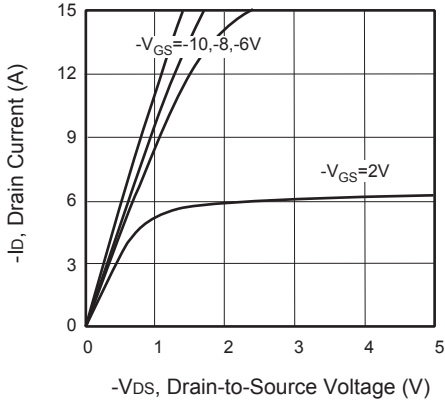


Figure 7. Output Characteristics

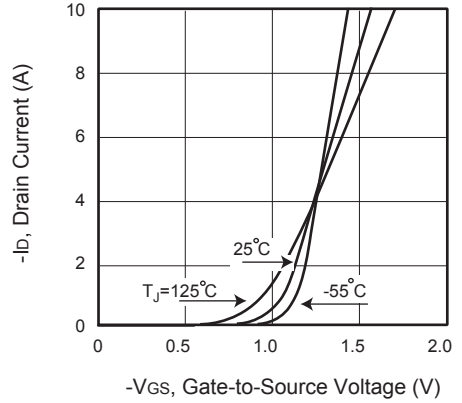


Figure 8. Transfer Characteristics

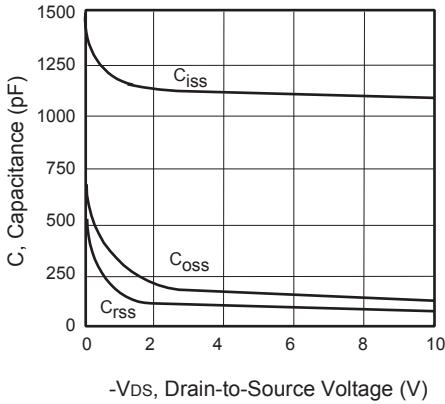


Figure 9. Capacitance

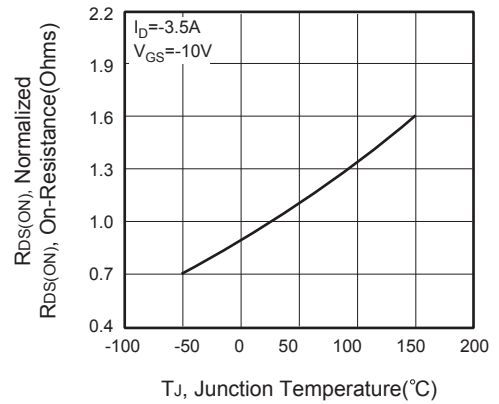


Figure 10. On-Resistance Variation with Temperature

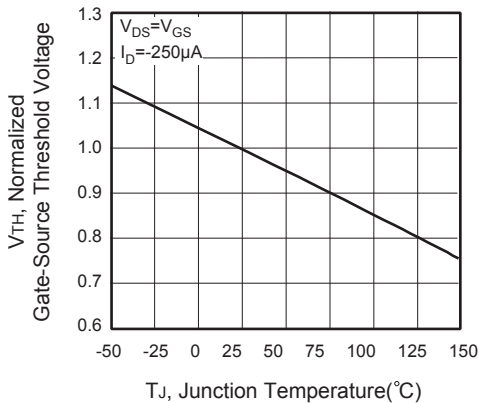


Figure 11. Gate Threshold Variation with Temperature

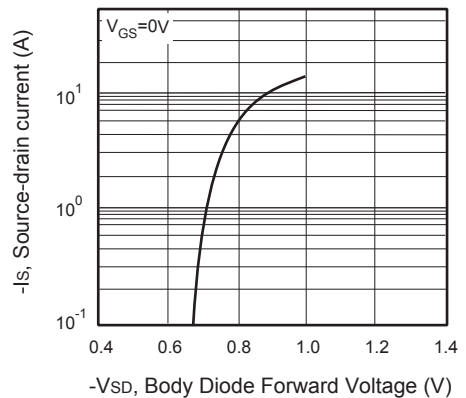


Figure 12. Body Diode Forward Voltage Variation with Source Current



CEM2539A

N-CHANNEL

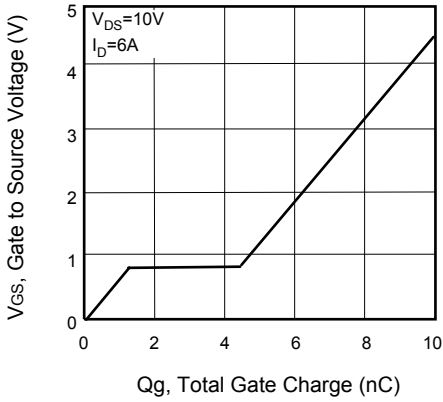


Figure 13. Gate Charge

P-CHANNEL

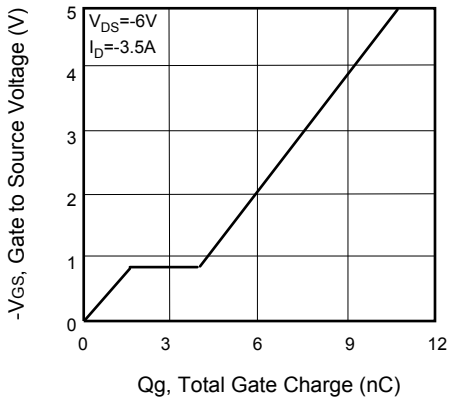


Figure 15. Gate Charge

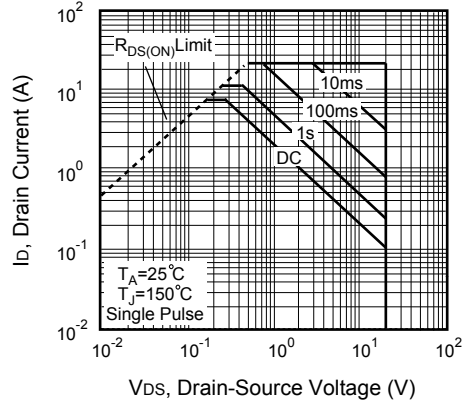


Figure 14. Maximum Safe Operating Area

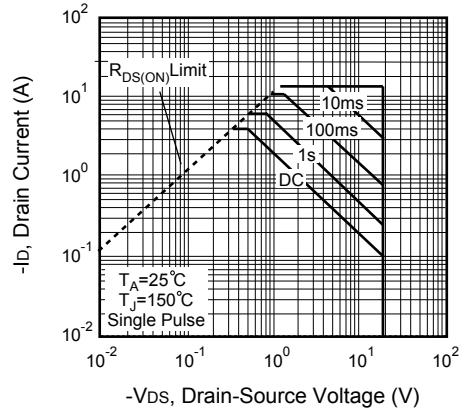


Figure 16. Maximum Safe Operating Area

5

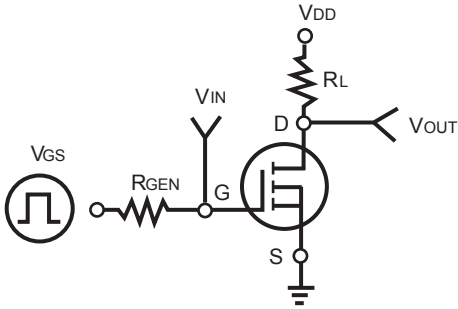


Figure 17. Switching Test Circuit

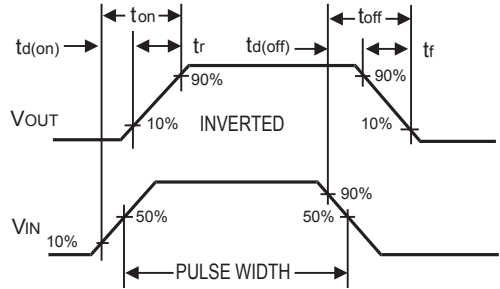


Figure 18. Switching Waveforms

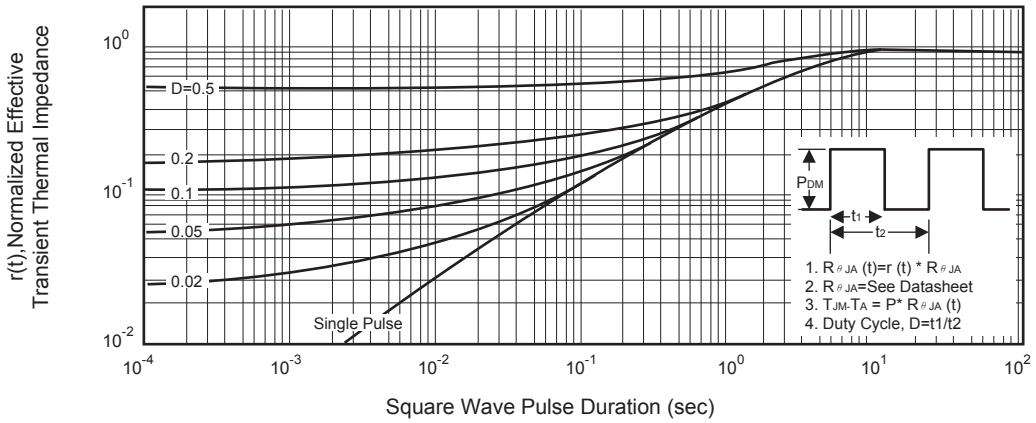


Figure 19. Normalized Thermal Transient Impedance Curve