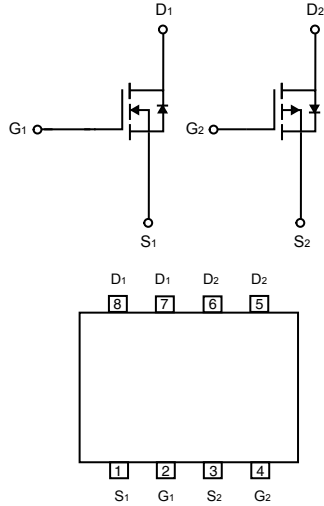
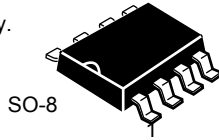


## Dual Enhancement Mode Field Effect Transistor (N and P Channel)

### 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.



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### 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	$V_{GS}$	$\pm 12$	$\pm 12$	V
Drain Current-Continuous	$I_D$	7.5	-4.0	A
Drain Current-Pulsed <sup>a</sup>	$I_{DM}$	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 <sup>b</sup>	$R_{\theta JA}$	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
<b>Off Characteristics</b>						
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	$\mu A$
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
<b>On Characteristics <sup>c</sup></b>						
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	$m\Omega$
<b>Dynamic Characteristics <sup>d</sup></b>						
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
<b>Switching Characteristics <sup>d</sup></b>						
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
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Drain-Source Diode Forward Current <sup>b</sup>	$I_S$				7.5	A
Drain-Source Diode Forward Voltage <sup>c</sup>	$V_{SD}$	$V_{GS} = 0V, I_S = 1A$			1	V
<b>Notes :</b> <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"/>						

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# CEM2539A

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
<b>Off Characteristics</b>						
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	$\mu A$
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
<b>On Characteristics<sup>c</sup></b>						
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 $\Omega$
<b>Dynamic Characteristics<sup>d</sup></b>						
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
<b>Switching Characteristics<sup>d</sup></b>						
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
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Drain-Source Diode Forward Current <sup>b</sup>	$I_S$				-3.7	A
Drain-Source Diode Forward Voltage <sup>c</sup>	$V_{SD}$	$V_{GS} = 0V, I_S = -1A$			-1	V
<b>Notes :</b> □ 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

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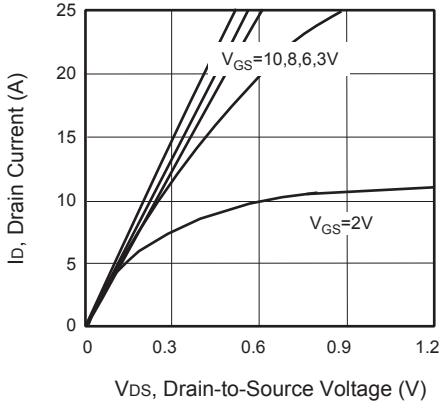


Figure 1. Output Characteristics

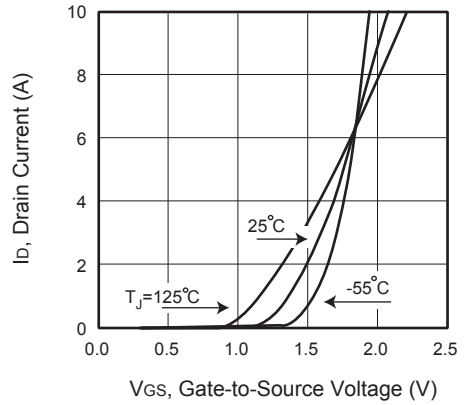


Figure 2. Transfer Characteristics

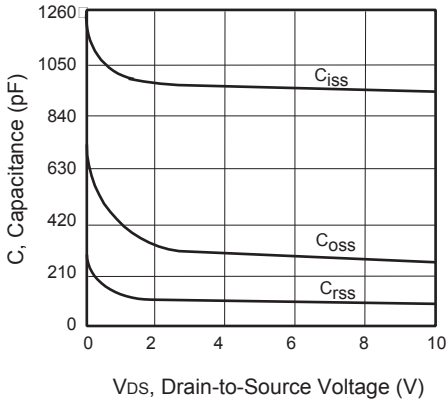


Figure 3. Capacitance

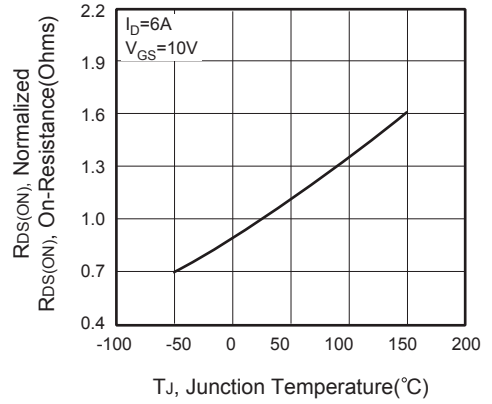


Figure 4. On-Resistance Variation with Temperature

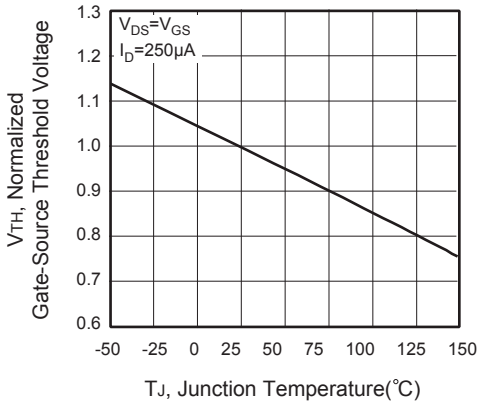


Figure 5. Gate Threshold Variation with Temperature

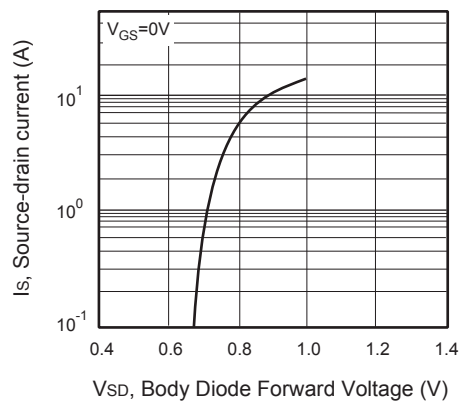


Figure 6. Body Diode Forward Voltage Variation with Source Current



# CEM2539A

## P-CHANNEL

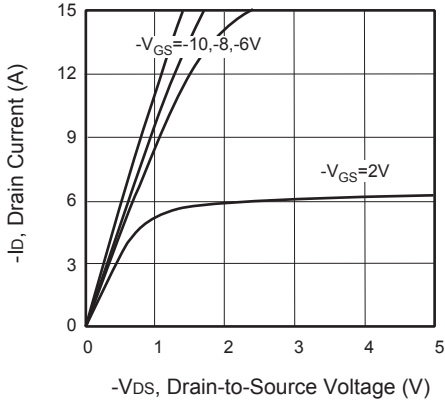


Figure 7. Output Characteristics

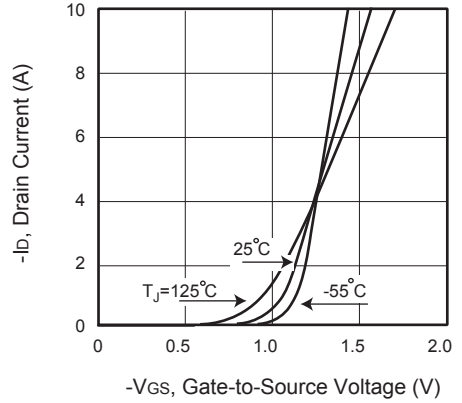


Figure 8. Transfer Characteristics

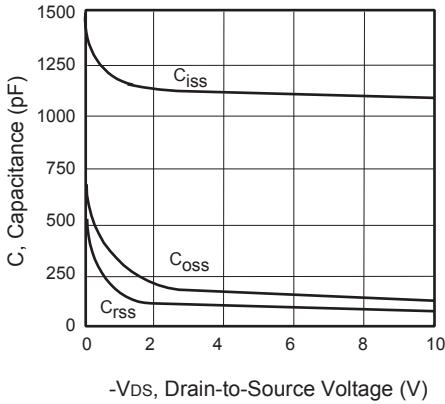


Figure 9. Capacitance

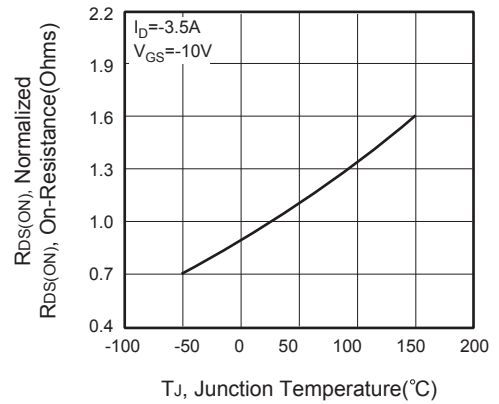


Figure 10. On-Resistance Variation with Temperature

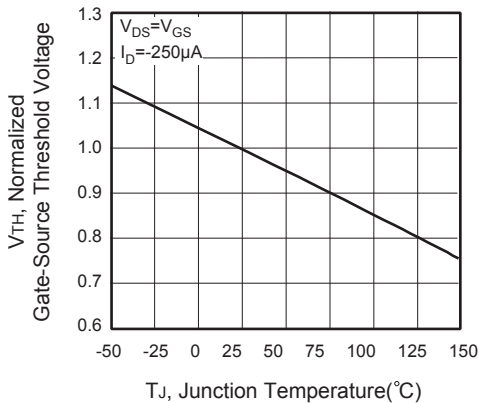


Figure 11. Gate Threshold Variation with Temperature

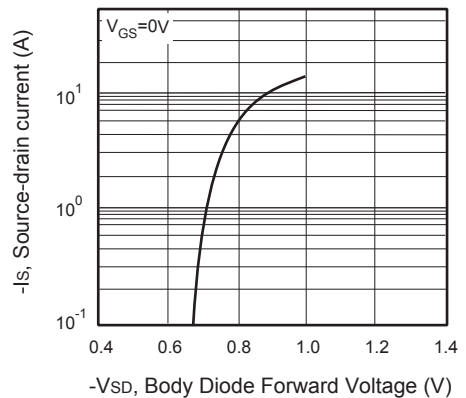


Figure 12. Body Diode Forward Voltage Variation with Source Current



# CEM2539A

## N-CHANNEL

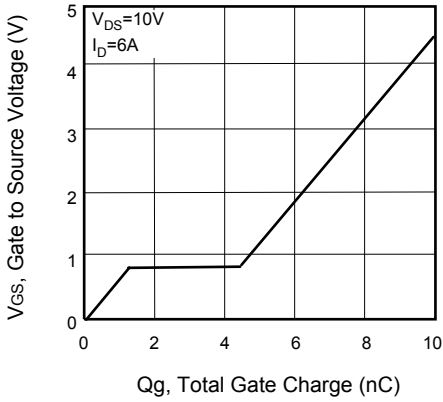


Figure 13. Gate Charge

## P-CHANNEL

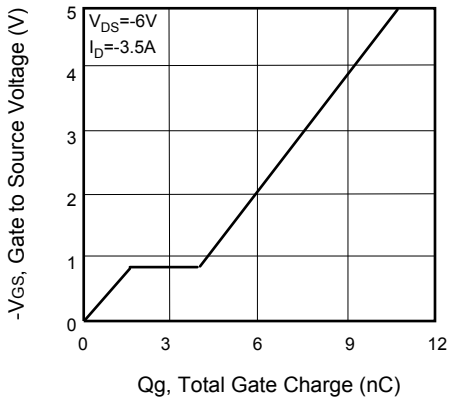


Figure 15. Gate Charge

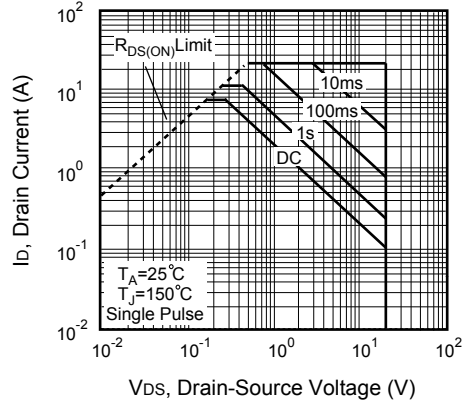


Figure 14. Maximum Safe Operating Area

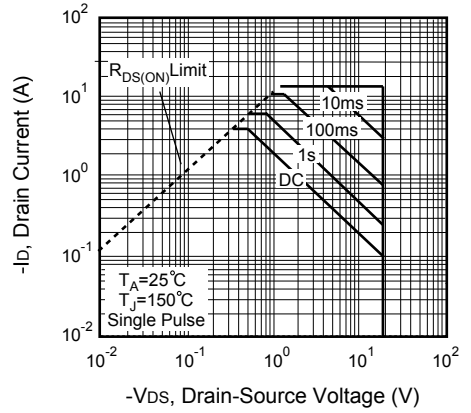


Figure 16. Maximum Safe Operating Area

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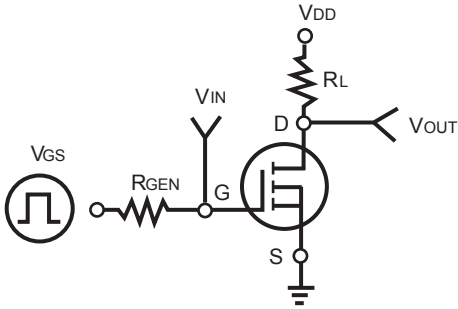


Figure 17. Switching Test Circuit

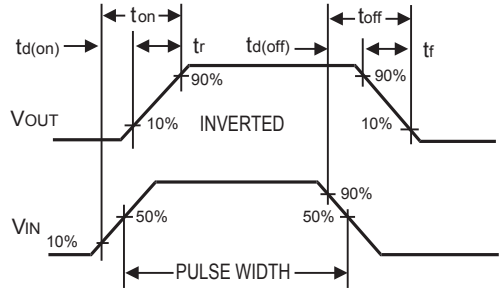


Figure 18. Switching Waveforms

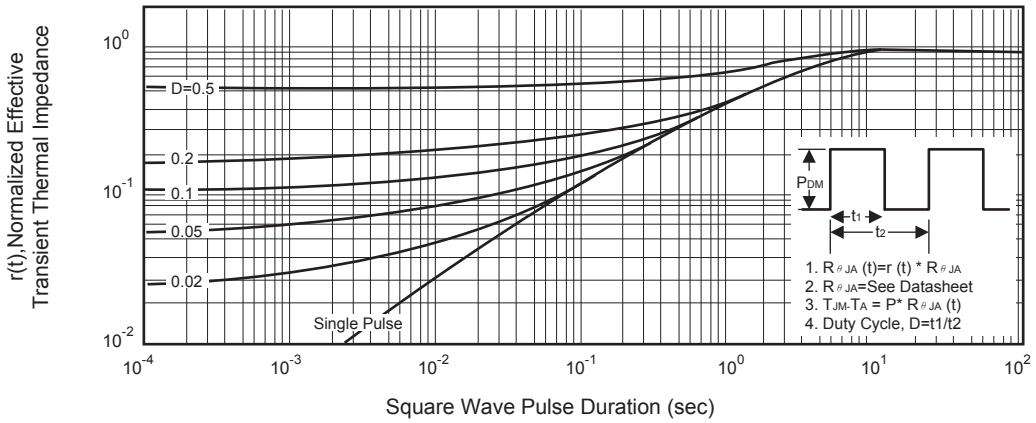


Figure 19. Normalized Thermal Transient Impedance Curve