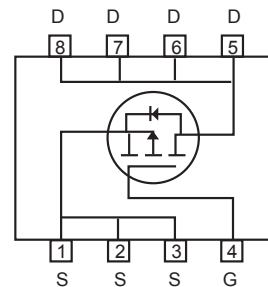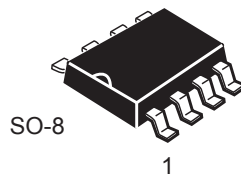# CEM4301

P-Channel Enhancement Mode Field Effect Transistor

FEATURES

- ■ -40V, -6A, $R_{DS(ON)}$ = 42mΩ @V_{GS} = -10V.
      $R_{DS(ON)}$ = 65mΩ @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.

SO-8

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```
  D   D   D   D
  8   7   6   5



  1   2   3   4
  S   S   S   G
```

ABSOLUTE MAXIMUM RATINGS T_A = 25°C unless otherwise noted

Parameter	Symbol	Limit	Units
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	$\pm$20	V
Drain Current-Continuous	I_D	-6	A
Drain Current-Pulsed [a]	I_{DM}	-20	A
Maximum Power Dissipation	P_D	2.5	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]	RθJA	50	$^{\circ}$C/W

Details are subject to change without notice .

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	-40			V
Zero Gate Voltage Drain Current	I$_{DSS}$	V$_{DS}$ = -32V, 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 [c]						
Gate Threshold Voltage	V$_{GS(th)}$	V$_{GS}$ = V$_{DS}$, I$_D$ = -250μA	-1		-3	V
Static Drain-Source	R$_{DS(on)}$	V$_{GS}$ = -10V, I$_D$ = -6A		34	42	mΩ
On-Resistance		V$_{GS}$ = -4.5V, I$_D$ = -3A		45	65	mΩ
Dynamic Characteristics [d]						
Forward Transconductance	g$_{FS}$	V$_{DS}$ = -5V, I$_D$ = -6A		5		S
Input Capacitance	C$_{iss}$	V$_{DS}$ = -20V, V$_{GS}$ = 0V, f = 1.0 MHz		1125		pF
Output Capacitance	C$_{oss}$			150		pF
Reverse Transfer Capacitance	C$_{rss}$			100		pF
Switching Characteristics [d]						
Turn-On Delay Time	t$_{d(on)}$	V$_{DD}$ = -20V, I$_D$ = -5A, V$_{GS}$ = -10V, R$_{GEN}$ = 3Ω		12	24	ns
Turn-On Rise Time	t$_r$			5	30	ns
Turn-Off Delay Time	t$_{d(off)}$			33	66	ns
Turn-Off Fall Time	t$_f$			4	8	ns
Total Gate Charge	Q$_g$	V$_{DS}$ = -20V, I$_D$ = -5A, V$_{GS}$ = -10V		20	26	nC
Gate-Source Charge	Q$_{gs}$			2.5		nC
Gate-Drain Charge	Q$_{gd}$			3.5		nC
Drain-Source Diode Characteristics and Maximun Ratings						
Drain-Source Diode Forward Current [b]	I$_S$				-6	A
Drain-Source Diode Forward Voltage [c]	V$_{SD}$	V$_{GS}$ = 0V, I$_S$ = -1A			-1.3	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.
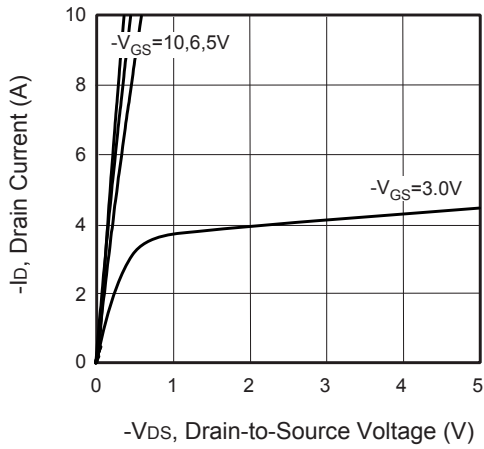
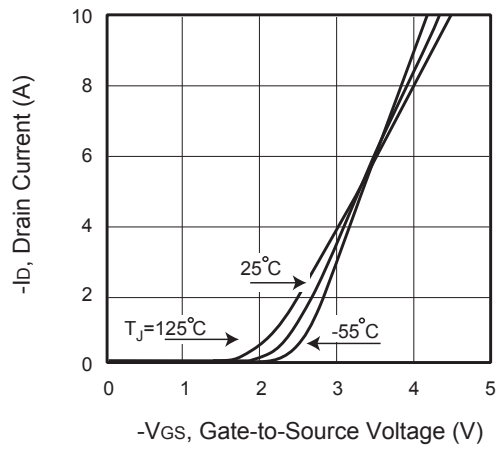**Figure 1. Output Characteristics**
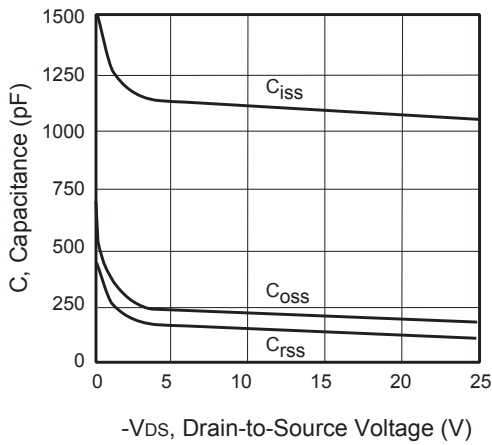

Figure 2. Transfer Characteristics
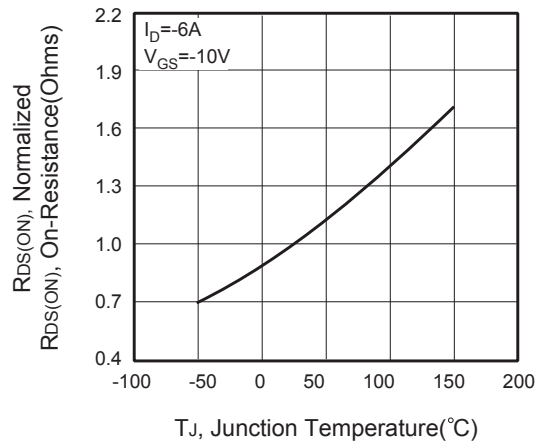

Figure 3. Capacitance

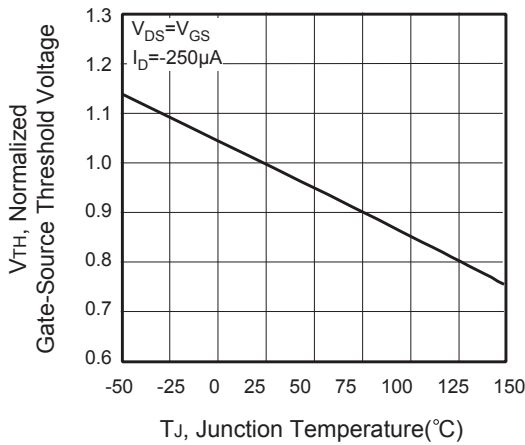**Figure 4. On-Resistance Variation
with Temperature**

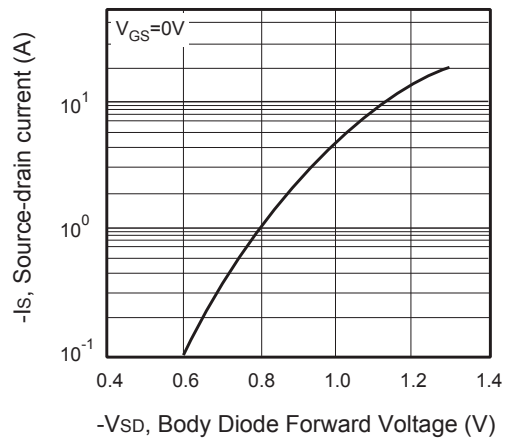**Figure 5. Gate Threshold Variation
with Temperature**

**Figure 6. Body Diode Forward Voltage
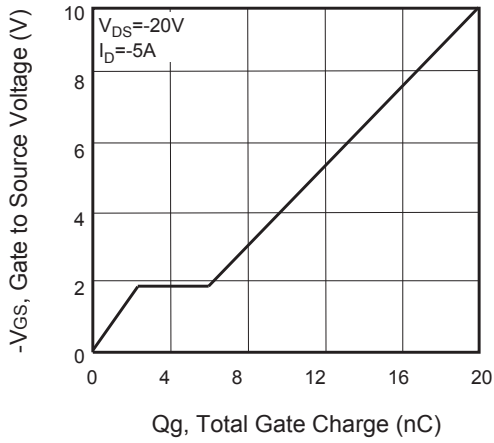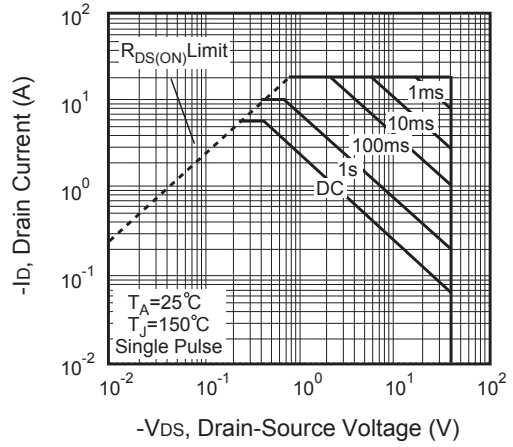Variation with Source Current**

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Figure 7. Gate Charge
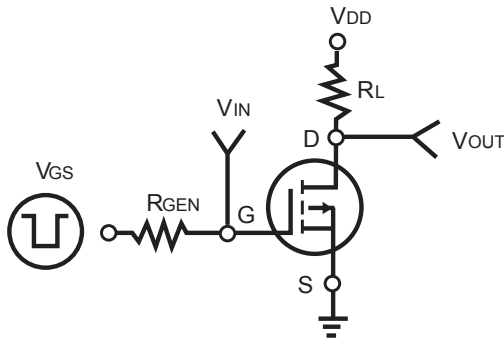

Figure 8. Maximum Safe Operating Area
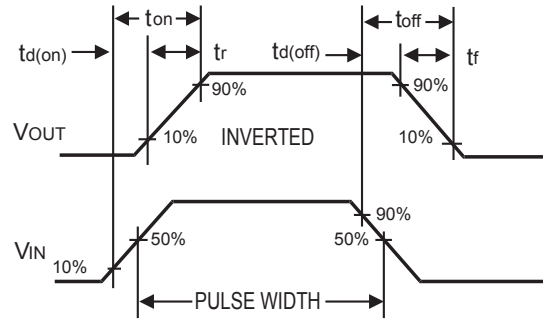

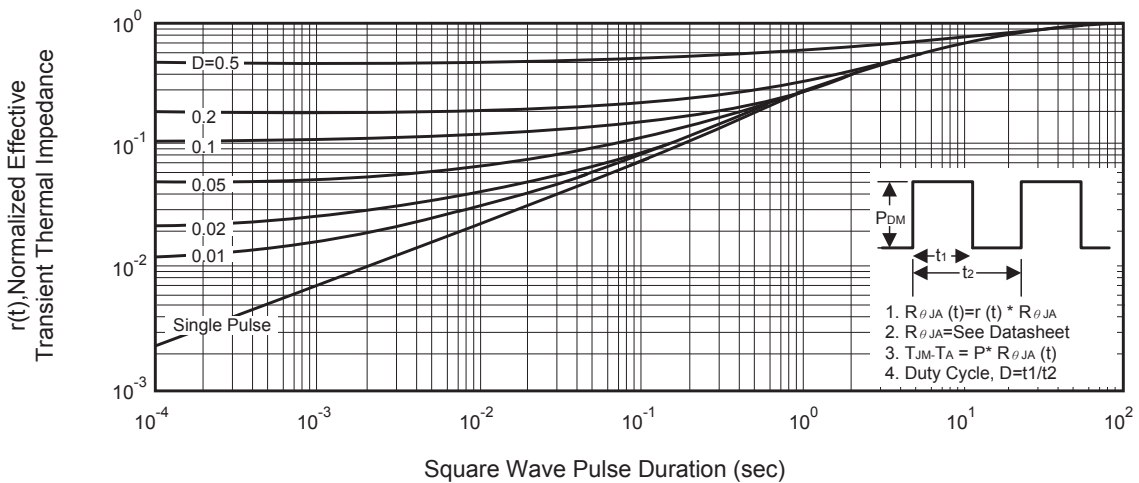Figure 9. Switching Test Circuit

Figure 10. Switching Waveforms

Figure 11. Normalized Thermal Transient Impedance Curve