

CEM8401



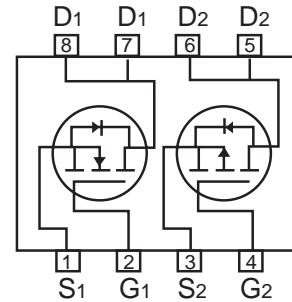
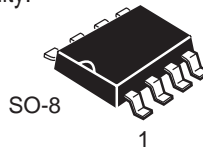
Feb. 2003

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

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FEATURES

- 30V , 7.5A , $R_{DS(ON)}=21m\Omega$ @ $V_{GS}=10V$.
 $R_{DS(ON)}=30m\Omega$ @ $V_{GS}=4.5V$.
- -30V , -5.0A , $R_{DS(ON)}=50m\Omega$ @ $V_{GS}=-10V$.
 $R_{DS(ON)}=75m\Omega$ @ $V_{GS}=-4.5V$.
- Super high dense cell design for extremely low $R_{DS(ON)}$.
- High power and current handling capability.
- Surface Mount Package.



ABSOLUTE MAXIMUM RATINGS ($T_A=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V_{DS}	30	-30	V
Gate-Source Voltage	V_{GS}	± 20	± 20	V
Drain Current-Continuous ^a -Pulsed	I_D	± 7.5	± 5.0	A
	I_{DM}	± 30	± 20	A
Drain-Source Diode Forward Current ^a	I_S	2.3	-2.3	A
Maximum Power Dissipation ^a	PD	2.0		W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150		$^{\circ}C$

THERMAL CHARACTERISTICS

Thermal Resistance, Junction-to-Ambient ^a	$R_{\theta JA}$	62.5	$^{\circ}C/W$
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N-Channel ELECTRICAL CHARACTERISTICS (TA=25 °C unless otherwise noted)

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Parameter	Symbol	Condition	Min	Typ ^c	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0V, I _D = 250μA	30			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 30V, V _{GS} = 0V			1	μA
Gate-Body Leakage	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V			±100	nA
ON CHARACTERISTICS^b						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	1		3	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} = 10V, I _D = 9A		18	21	mΩ
		V _{GS} = 4.5V, I _D = 7.4A		25	30	mΩ
On-State Drain Current	I _{D(ON)}	V _{DS} = 5V, V _{GS} = 10V	15			A
Forward Transconductance	g _{FS}	V _{DS} = 15V, I _D = 9A		16		S
DYNAMIC CHARACTERISTICS^c						
Input Capacitance	C _{ISS}	V _{DS} = 25V, V _{GS} = 0V f = 1.0MHz		857		pF
Output Capacitance	C _{OSS}			343		pF
Reverse Transfer Capacitance	C _{RSS}			105		pF
SWITCHING CHARACTERISTICS^c						
Turn-On Delay Time	t _{D(ON)}	V _{DD} = 15V, I _D = 3.5A, V _{GS} = 10V, R _{GEN} = 6Ω		22	45	ns
Rise Time	t _r			34	70	ns
Turn-Off Delay Time	t _{D(OFF)}			43	90	ns
Fall Time	t _f			18	35	ns
Total Gate Charge	Q _g	V _{DS} = 15V, I _D = 4.7A, V _{GS} = 10V		28	35	nC
Gate-Source Charge	Q _{gs}			4		nC
Gate-Drain Charge	Q _{gd}			7.5		nC

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P-Channel ELECTRICAL CHARACTERISTICS (TA=25 °C unless otherwise noted)

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Parameter	Symbol	Condition	Min	Typ ^c	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0V, I _D = 250μA	-30			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = -30V, V _{GS} = 0V			-1	μA
Gate-Body Leakage	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V			±100	nA
ON CHARACTERISTICS^b						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-1		-3	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} = -10V, I _D = -4.2A		40	50	mΩ
		V _{GS} = -4.5V, I _D = -3.4A		65	75	mΩ
On-State Drain Current	I _{D(ON)}	V _{DS} = -5V, V _{GS} = -10V	-15			A
Forward Transconductance	g _{FS}	V _{DS} = -15V, I _D = -4.2A		7		S
DYNAMIC CHARACTERISTICS^c						
Input Capacitance	C _{ISS}	V _{DS} = -15V, V _{GS} = 0V f = 1.0MHz		1124		pF
Output Capacitance	C _{OSS}			488		pF
Reverse Transfer Capacitance	C _{RSS}			150		pF
SWITCHING CHARACTERISTICS^c						
Turn-On Delay Time	t _{D(ON)}	V _{DD} = -15V, I _D = -4.2A, V _{GEN} = -10V, R _{GEN} = 6Ω		21	40	ns
Rise Time	t _r			23	45	ns
Turn-Off Delay Time	t _{D(OFF)}			33	65	ns
Fall Time	t _f			60	100	ns
Total Gate Charge	Q _g	V _{DS} = -15V, I _D = -4.2A, V _{GS} = -10V		30	36	nC
Gate-Source Charge	Q _{gs}			4		nC
Gate-Drain Charge	Q _{gd}			7.5		nC

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ELECTRICAL CHARACTERISTICS ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ ^c	Max	Unit
DRAIN-SOURCE DIODE CHARACTERISTICS^b						
Diode Forward Voltage	V_{SD}	$V_{GS} = 0\text{V}, I_S = 5.1\text{A}$ N-Ch		0.8	1.2	V
		$V_{GS} = 0\text{V}, I_S = -3.6\text{A}$ P-Ch		-0.8	-1.2	

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Notes

- a. Surface Mounted on FR4 Board, $t \leq 10\text{sec}$.
- b. Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2\%$.
- c. Guaranteed by design, not subject to production testing.

N-Channel

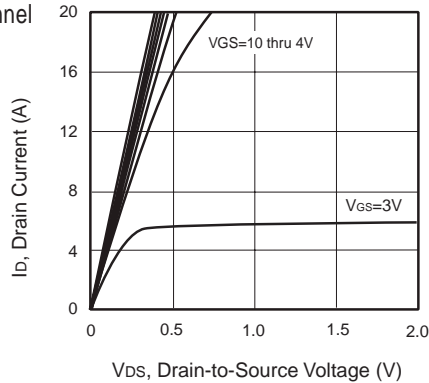


Figure 1. Output Characteristics

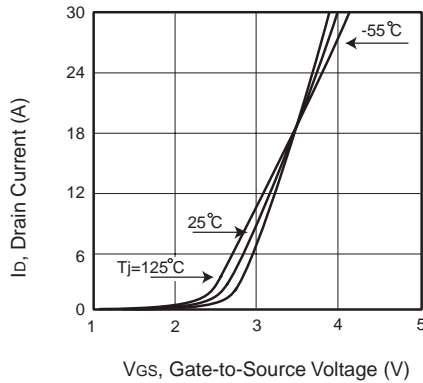


Figure 2. Transfer Characteristics

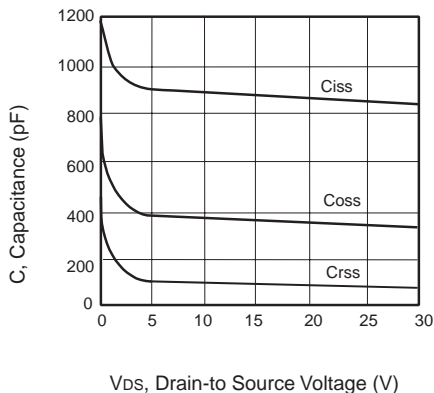


Figure 3. Capacitance

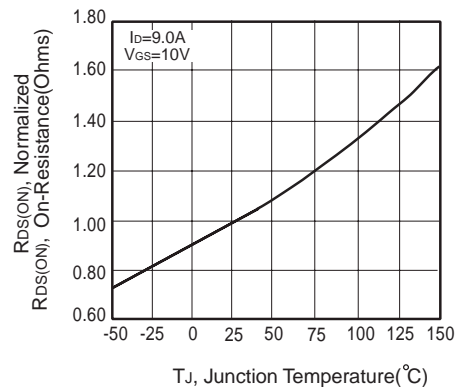


Figure 4. On-Resistance Variation with Temperature

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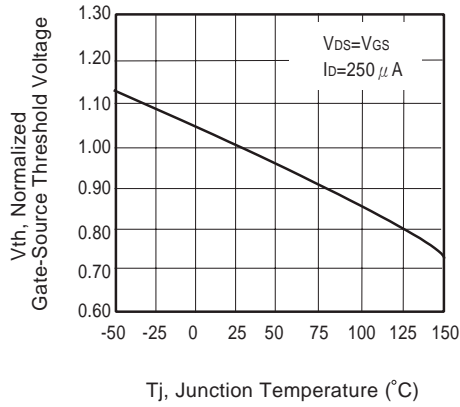


Figure 5. Gate Threshold Variation with Temperature

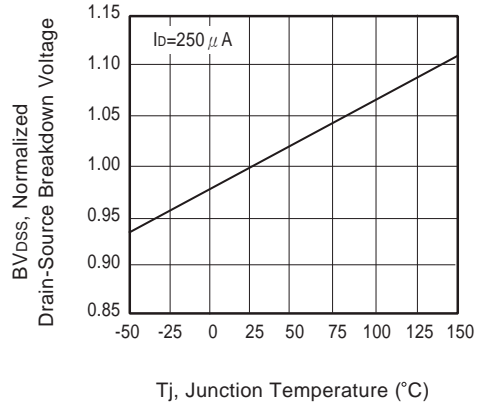


Figure 6. Breakdown Voltage Variation with Temperature

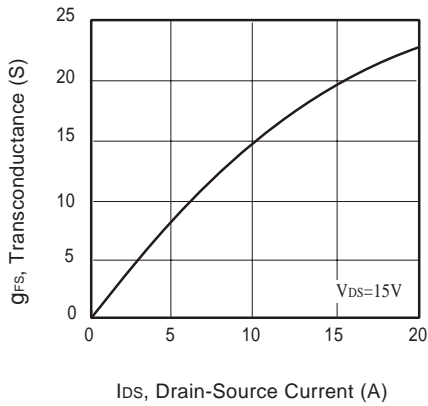


Figure 7. Transconductance Variation with Drain Current

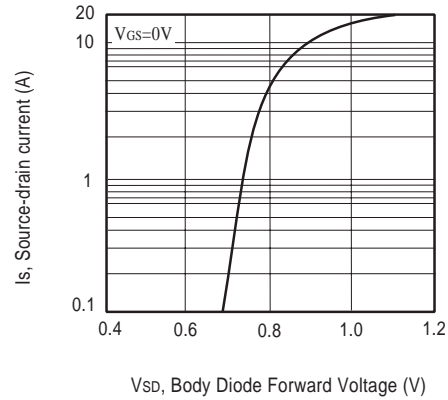


Figure 8. Body Diode Forward Voltage Variation with Source Current

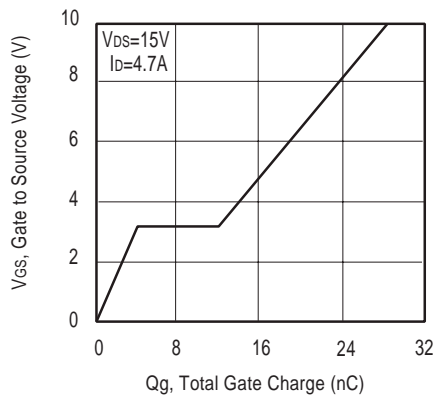


Figure 9. Gate Charge

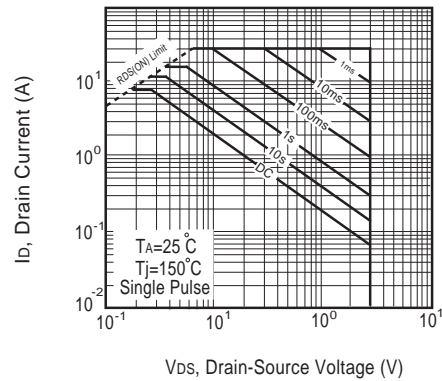


Figure 10. Maximum Safe Operating Area

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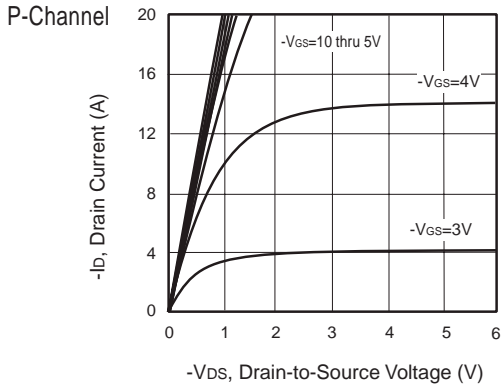


Figure 11. Output Characteristics

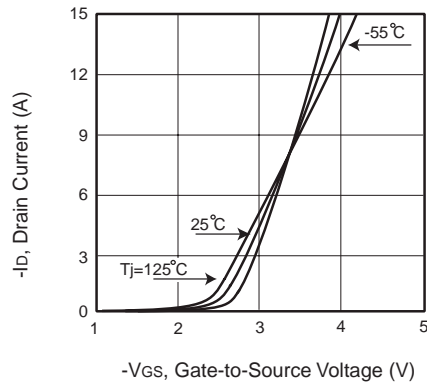


Figure 12. Transfer Characteristics

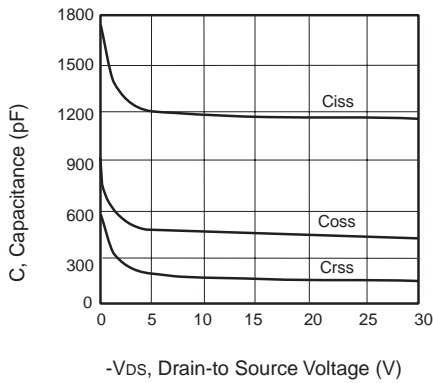


Figure 13. Capacitance

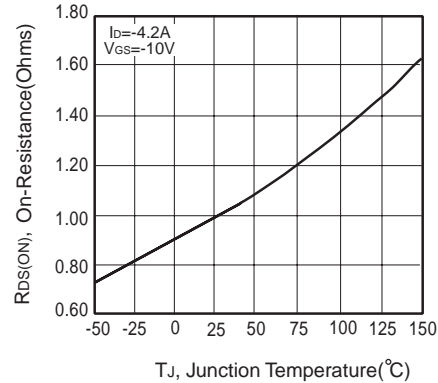


Figure 14. On-Resistance Variation with Temperature

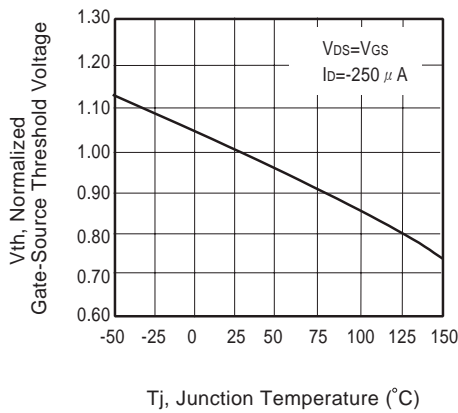


Figure 15. Gate Threshold Variation with Temperature

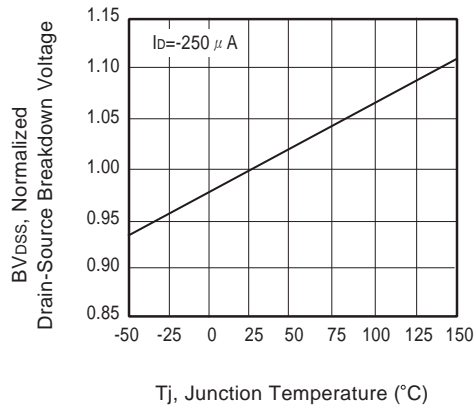


Figure 16. Breakdown Voltage Variation with Temperature

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P-Channel

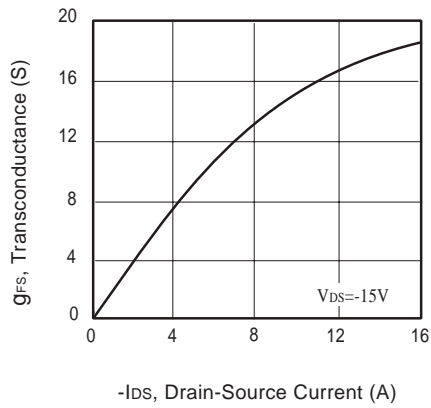


Figure 17. Transconductance Variation with Drain Current

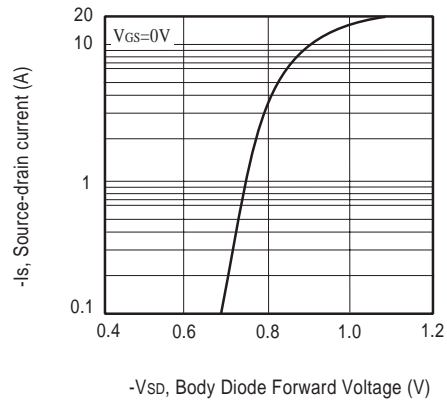


Figure 18. Body Diode Forward Voltage Variation with Source Current

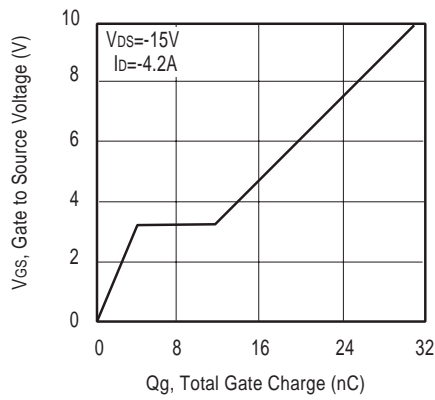


Figure 19. Gate Charge

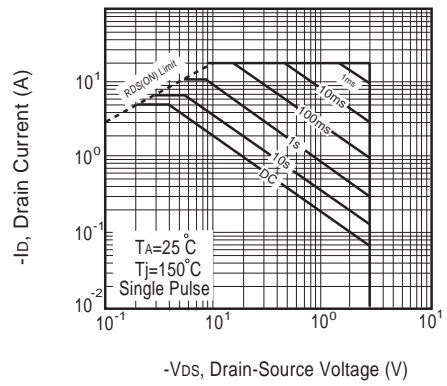


Figure 20. Maximum Safe Operating Area

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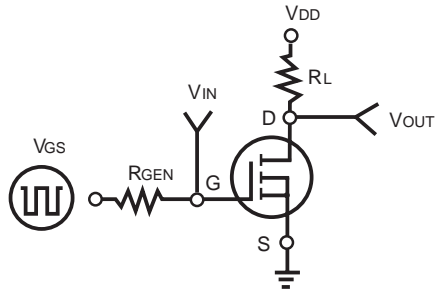


Figure 21. Switching Test Circuit

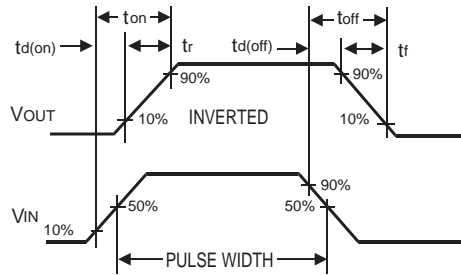


Figure 22. Switching Waveforms

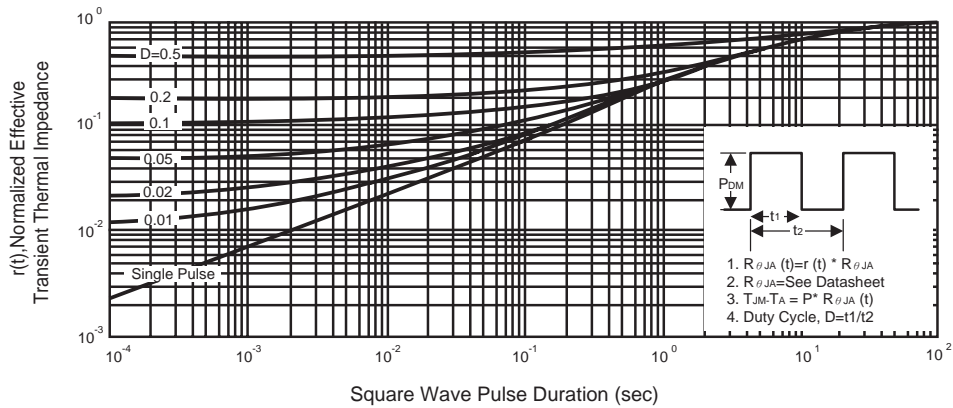


Figure 23. Normalized Thermal Transient Impedance Curve