

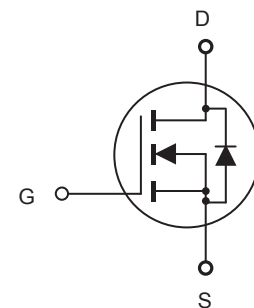
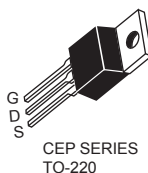
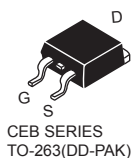


CEP4060AL/CEB4060AL

N-Channel Enhancement Mode Field Effect Transistor

FEATURES

- 60V, 17A, $R_{DS(ON)} = 75m\Omega$ @ $V_{GS} = 10V$.
 $R_{DS(ON)} = 90m\Omega$ @ $V_{GS} = 5.0V$.
- Super high dense cell design for extremely low $R_{DS(ON)}$.
- High power and current handling capability.
- Lead free product is acquired.
- TO-220 & TO-263 package.



ABSOLUTE MAXIMUM RATINGS $T_C = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Limit	Units
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous @ $T_C = 25^\circ\text{C}$ @ $T_C = 100^\circ\text{C}$	I_D	17	A
		12	A
Drain Current-Pulsed ^a	I_{DM}	68	A
Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$ - Derate above 25°C	P_D	43	W
		0.3	W/ $^\circ\text{C}$
Operating and Store Temperature Range	T_J, T_{stg}	-65 to 175	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Limit	Units
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.5	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$



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Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	60			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 60V, V_{GS} = 0V$			25	μA
Gate Body Leakage Current, Forward	I_{GSSF}	$V_{GS} = 16V, V_{DS} = 0V$			100	nA
Gate Body Leakage Current, Reverse	I_{GSSR}	$V_{GS} = -16V, V_{DS} = 0V$			-100	nA
On Characteristics ^b						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	1	1.5	2	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 12A$		60	75	m Ω
On-Resistance		$V_{GS} = 5V, I_D = 6A$		70	90	m Ω
Forward Transconductance	g_{FS}	$V_{DS} = 10V, I_D = 6A$		10		S
Dynamic Characteristics ^c						
Input Capacitance	C_{iss}	$V_{DS} = 25V, V_{GS} = 0V, f = 1.0\text{ MHz}$		405		pF
Output Capacitance	C_{oss}			120		pF
Reverse Transfer Capacitance	C_{rss}			30		pF
Switching Characteristics ^c						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 30V, I_D = 15A, V_{GS} = 5V, R_{GEN} = 51\Omega$		10	13	ns
Turn-On Rise Time	t_r			7	9	ns
Turn-Off Delay Time	$t_{d(off)}$			84	110	ns
Turn-Off Fall Time	t_f			22	29	ns
Total Gate Charge	Q_g	$V_{DS} = 48V, I_D = 15A, V_{GS} = 10V$		12	17	nC
Gate-Source Charge	Q_{gs}			1.1		nC
Gate-Drain Charge	Q_{gd}			3.2		nC
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Current	I_S				15	A
Drain-Source Diode Forward Voltage ^b	V_{SD}	$V_{GS} = 0V, I_S = 6A$		0.9	1.3	V
Notes : ^a Repetitive Rating : Pulse width limited by maximum junction temperature. ^b Pulse Test : Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$. ^c Guaranteed by design, not subject to production testing.						



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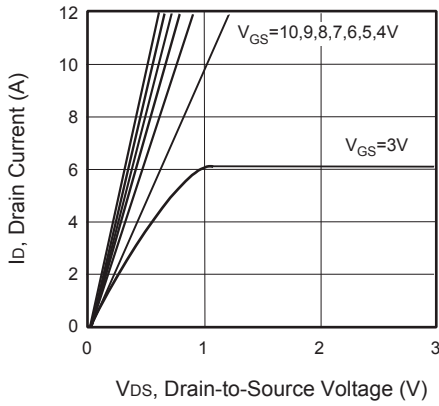


Figure 1. Output Characteristics

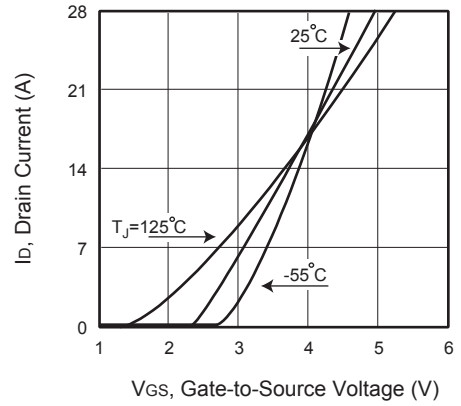


Figure 2. Transfer Characteristics

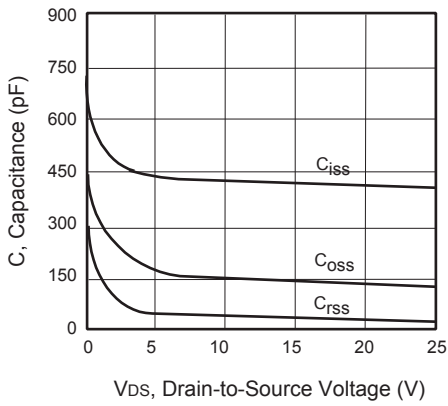


Figure 3. Capacitance

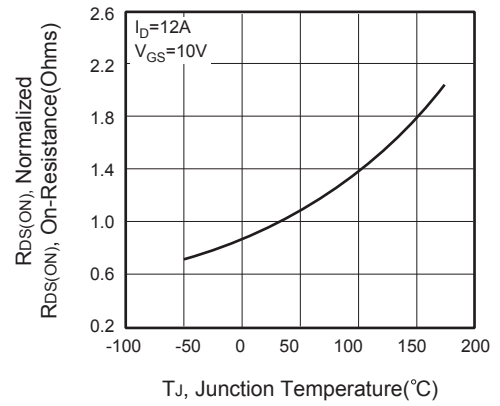


Figure 4. On-Resistance Variation with Temperature

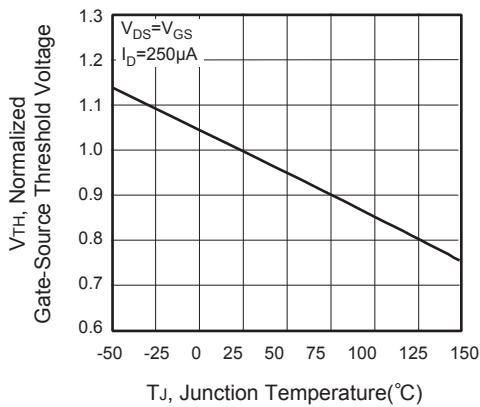


Figure 5. Gate Threshold Variation with Temperature

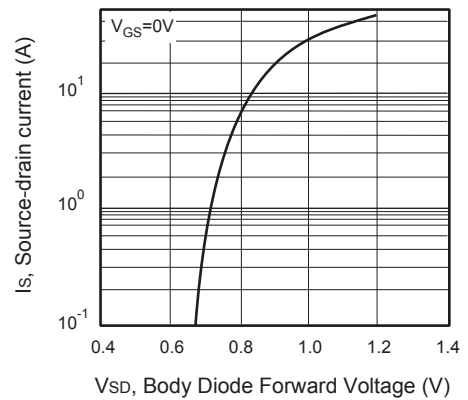


Figure 6. Body Diode Forward Voltage Variation with Source Current



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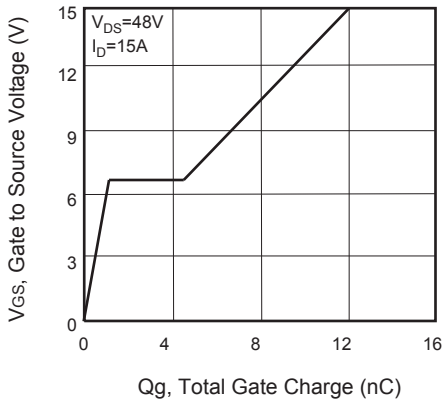


Figure 7. Gate Charge

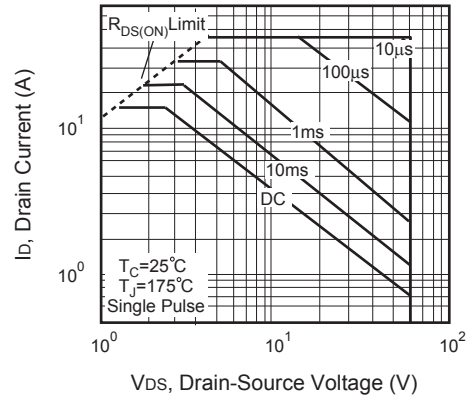


Figure 8. Maximum Safe Operating Area

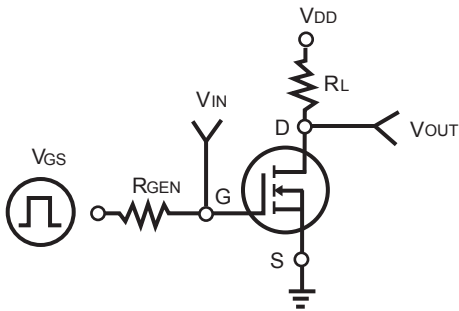


Figure 9. Switching Test Circuit

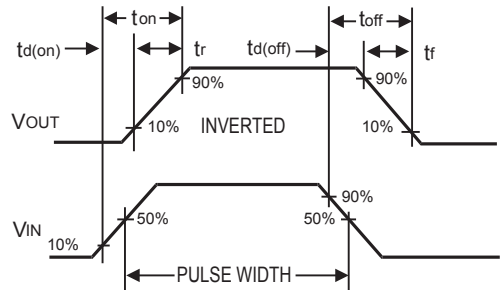


Figure 10. Switching Waveforms

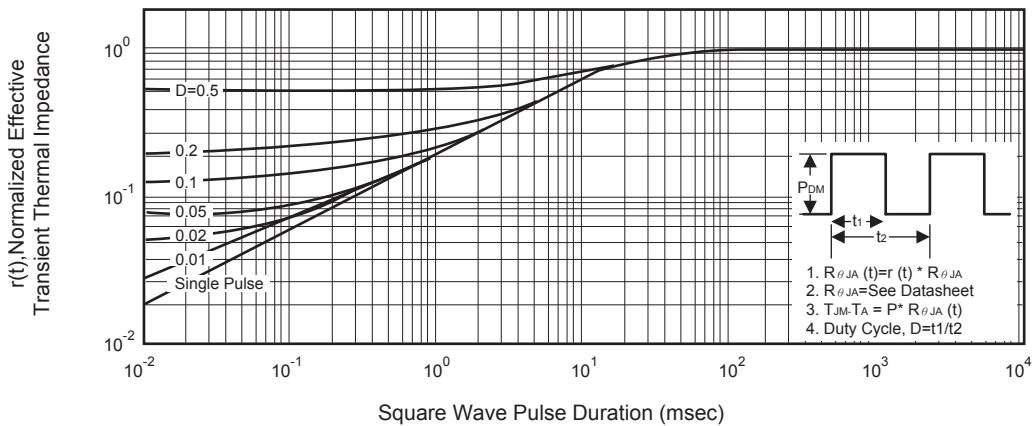


Figure 11. Normalized Thermal Transient Impedance Curve