



CEP04N65/CEB04N65 CEF04N65

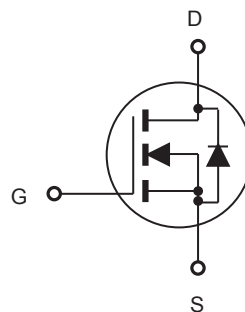
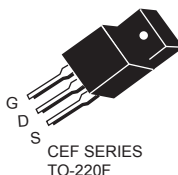
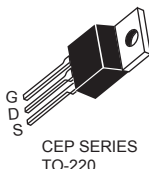
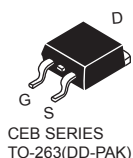
N-Channel Enhancement Mode Field Effect Transistor

PRELIMINARY

FEATURES

Type	V _{DSS}	R _{DS(ON)}	I _D	@V _{GS}
CEP04N65	650V	2.8Ω	4A	10V
CEB04N65	650V	2.8Ω	4A	10V
CEF04N65	650V	2.8Ω	4A ^d	10V

- Super high dense cell design for extremely low R_{DS(ON)}.
- High power and current handling capability.
- Lead-free plating ; RoHS compliant.



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

Parameter	Symbol	Limit		Units
		TO-220/263	TO-220F	
Drain-Source Voltage	V _{DS}	650		V
Gate-Source Voltage	V _{GS}	±30		V
Drain Current-Continuous @ T _C = 25 °C @ T _C = 100 °C	I _D	4	4 ^d	A
		2.4	2.4 ^d	A
Drain Current-Pulsed ^a	I _{DM} ^e	16	16 ^d	A
Maximum Power Dissipation @ T _C = 25 °C - Derate above 25 °C	P _D	104	35	W
		0.83	0.28	W/°C
Single Pulsed Avalanche Energy ^g	E _{AS}	220		mJ
Single Pulsed Avalanche Current ^g	I _{AS}	4.2		A
Operating and Store Temperature Range	T _J , T _{stg}	-55 to 150		°C

Thermal Characteristics

Parameter	Symbol	Limit		Units
Thermal Resistance, Junction-to-Case	R _{θJC}	1.2	3.6	°C/W
Thermal Resistance, Junction-to-Ambient	R _{θJA}	62.5	65	°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}	$V_{GS} = 0V, I_D = 250\mu A$	650			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 650V, V_{GS} = 0V$			1	μA
Gate Body Leakage Current, Forward	I_{GSSF}	$V_{GS} = 30V, V_{DS} = 0V$			100	nA
Gate Body Leakage Current, Reverse	I_{GSSR}	$V_{GS} = -30V, V_{DS} = 0V$			-100	nA
On Characteristics ^b						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	2		4	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 2A$		2.3	2.8	Ω
Dynamic Characteristics ^c						
Input Capacitance	C_{iss}	$V_{DS} = 25V, V_{GS} = 0V, f = 1.0\text{ MHz}$		610		pF
Output Capacitance	C_{oss}			75		pF
Reverse Transfer Capacitance	C_{rss}			15		pF
Switching Characteristics ^c						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 300V, I_D = 4A, V_{GS} = 10V, R_{GEN} = 25\Omega$		18		ns
Turn-On Rise Time	t_r			18		ns
Turn-Off Delay Time	$t_{d(off)}$			33		ns
Turn-Off Fall Time	t_f			16		ns
Total Gate Charge	Q_g	$V_{DS} = 480V, I_D = 4A, V_{GS} = 10V$		12		nC
Gate-Source Charge	Q_{gs}			3		nC
Gate-Drain Charge	Q_{gd}			5		nC
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Current	I_S ^f				4	A
Drain-Source Diode Forward Voltage ^b	V_{SD}	$V_{GS} = 0V, I_S = 4A$			1.2	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. d.Limited only by maximum temperature allowed . e.Pulse width limited by safe operating area . f.Full package $I_{S(max)} = 2.2A$. g.L = 25mH, $I_{AS} = 4.2A$, $V_{DD} = 50V$, $R_G = 25\Omega$, Starting $T_J = 25\text{ C}$						



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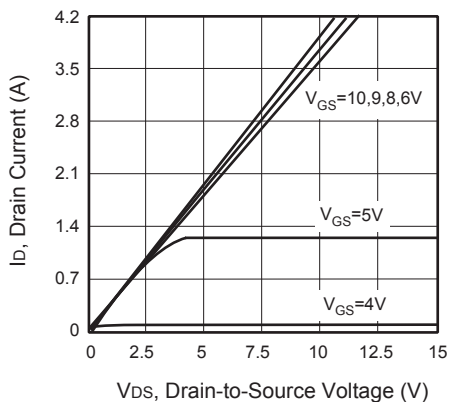


Figure 1. Output Characteristics

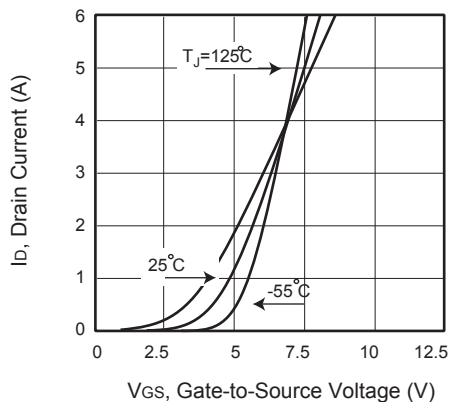


Figure 2. Transfer Characteristics

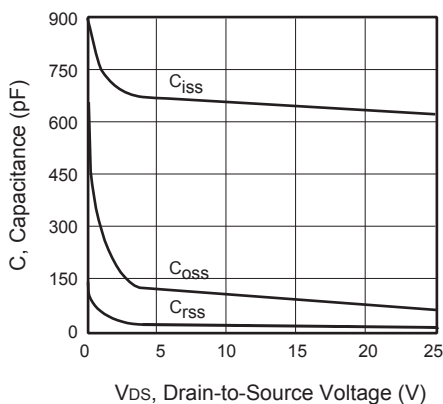


Figure 3. Capacitance

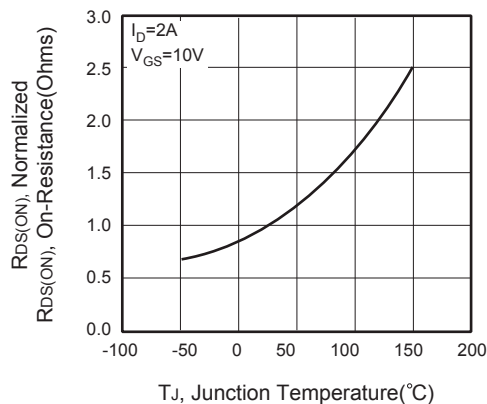


Figure 4. On-Resistance Variation with Temperature

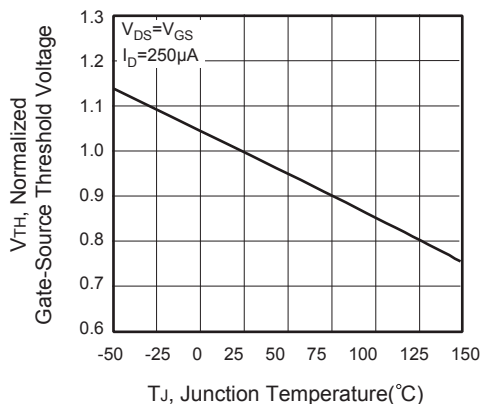


Figure 5. Gate Threshold Variation with Temperature

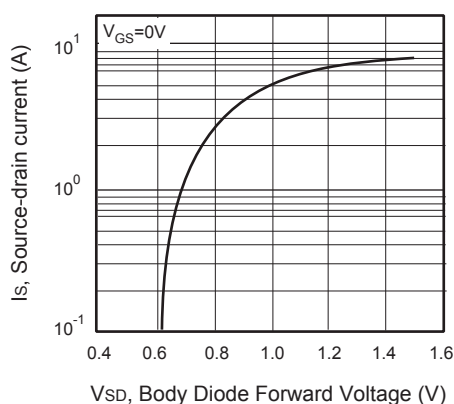


Figure 6. Body Diode Forward Voltage Variation with Source Current



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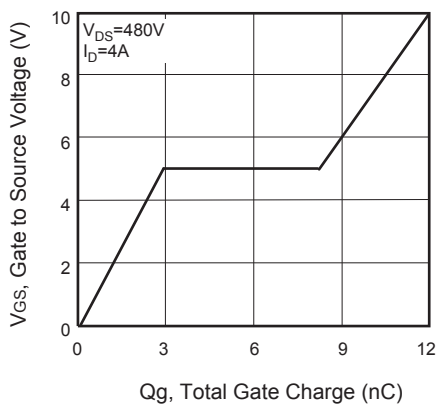


Figure 7. Gate Charge

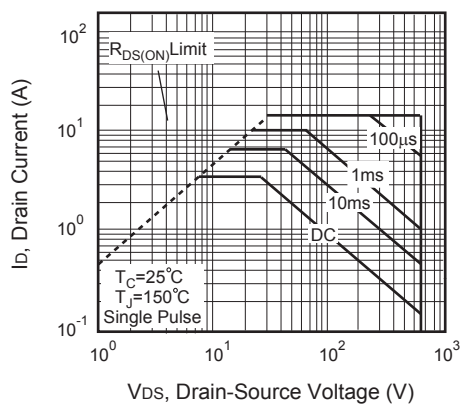


Figure 8. Maximum Safe Operating Area

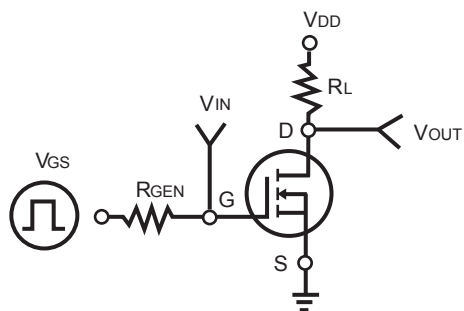


Figure 9. Switching Test Circuit

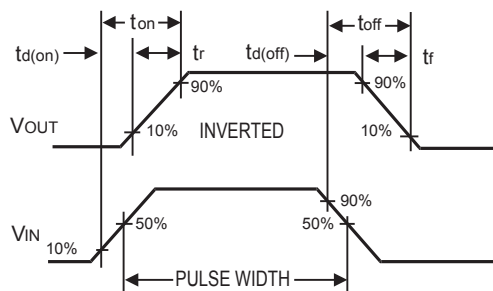


Figure 10. Switching Waveforms

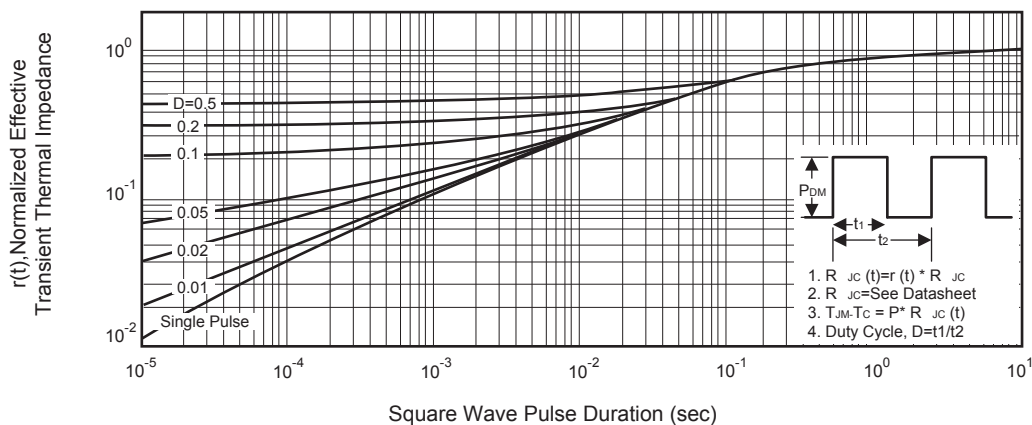


Figure 11. Normalized Thermal Transient Impedance Curve