



# CEP38N65SA/CEB38N65SA CEF38N65SA

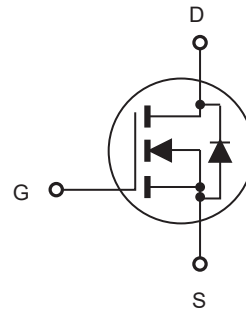
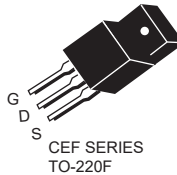
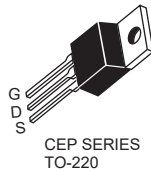
N-Channel Enhancement Mode Field Effect Transistor

PRELIMINARY

## FEATURES

Type	V <sub>DSS</sub>	R <sub>DS(ON)</sub>	I <sub>D</sub>	@V <sub>GS</sub>
CEP38N65SA	650V	0.095Ω	39A	10V
CEB38N65SA	650V	0.095Ω	39A	10V
CEF38N65SA	650V	0.095Ω	39A <sup>d</sup>	10V

- Super high dense cell design for extremely low R<sub>DS(ON)</sub>.
- High power and current handling capability.
- 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 <sub>DS</sub>	650		V
Gate-Source Voltage	V <sub>GS</sub>	±30		V
Drain Current-Continuous @ T <sub>C</sub> = 25°C @ T <sub>C</sub> = 100°C	I <sub>D</sub>	39	39 <sup>d</sup>	A
		24.5	24.5 <sup>d</sup>	A
Drain Current-Pulsed <sup>a</sup>	I <sub>DM</sub> <sup>e</sup>	156	156 <sup>d</sup>	A
Maximum Power Dissipation @ T <sub>C</sub> = 25°C - Derate above 25°C	P <sub>D</sub>	357	89	W
		2.9	0.7	W/°C
Single Pulsed Avalanche Energy <sup>h</sup>	E <sub>AS</sub>	735		mJ
Single Pulsed Avalanche Current <sup>h</sup>	I <sub>AS</sub>	7		A
Operating and Store Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to 150		°C

## Thermal Characteristics

Parameter	Symbol	Limit		Units
Thermal Resistance, Junction-to-Case	R <sub>θJC</sub>	0.35	1.4	°C/W
Thermal Resistance, Junction-to-Ambient	R <sub>θJA</sub>	62.5	65	°C/W

This is preliminary information on a new product in development now .  
Details are subject to change without notice .

Rev 1. 2022.April  
<http://www.cet-mos.com>



# CEP38N65SA/CEB38N65SA CEF38N65SA

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	650			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 650V, V_{GS} = 0V$			1	$\mu A$
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
<b>On Characteristics<sup>b</sup></b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	2.5		4.5	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 20A$		0.08	0.095	$\Omega$
<b>Dynamic Characteristics<sup>c</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 150V, V_{GS} = 0V,$ $f = 1.0\text{ MHz}$		1915		pF
Output Capacitance	$C_{oss}$			110		pF
Reverse Transfer Capacitance	$C_{rss}$			5		pF
<b>Switching Characteristics<sup>c</sup></b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 520V, I_D = 20A,$ $V_{GS} = 10V, R_{GEN} = 6\Omega$		37		ns
Turn-On Rise Time	$t_r$			17		ns
Turn-Off Delay Time	$t_{d(off)}$			95		ns
Turn-Off Fall Time	$t_f$			9		ns
Total Gate Charge	$Q_g$	$V_{DS} = 520V, I_D = 20A,$ $V_{GS} = 10V$		69		nC
Gate-Source Charge	$Q_{gs}$			12		nC
Gate-Drain Charge	$Q_{gd}$			30		nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Drain-Source Diode Forward Current	$I_S^f$				39	A
Drain-Source Diode Forward Voltage <sup>b</sup>	$V_{SD}$	$V_{GS} = 0V, I_S = 20A^g$			1.5	V
<b>Notes :</b> 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 $I_{S(max)} = 19A$ . g.Full package $V_{SD}$ test condition $I_S = 19A$ . h.L = 30mH, $I_{AS} = 7A, V_{DD} = 60V, R_G = 25\Omega$ , Starting $T_J = 25\text{ C}$ .						



# CEP38N65SA/CEB38N65SA CEF38N65SA

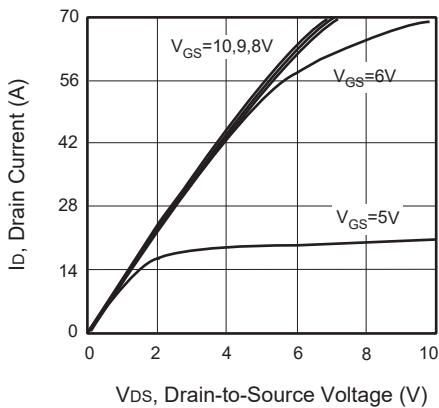


Figure 1. Output Characteristics

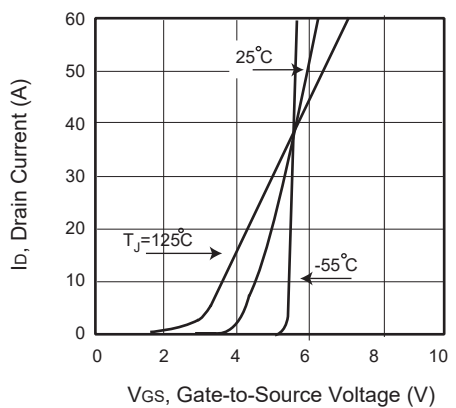


Figure 2. Transfer Characteristics

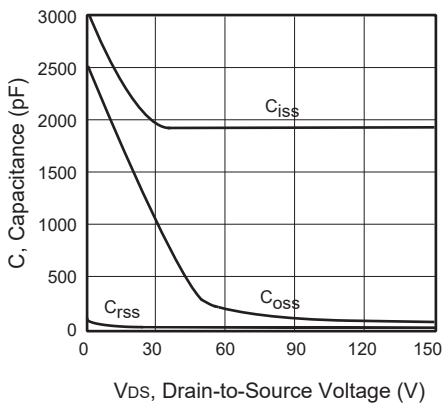


Figure 3. Capacitance

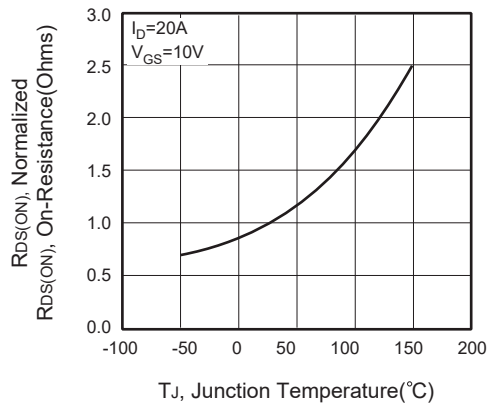


Figure 4. On-Resistance Variation with Temperature

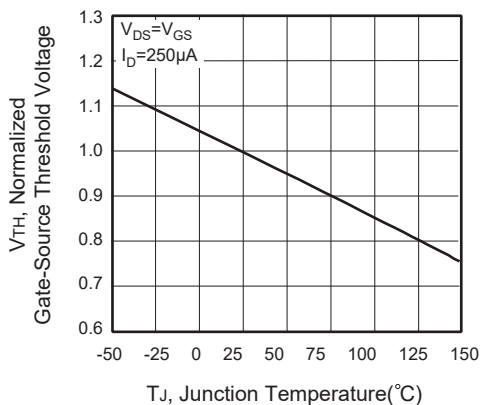


Figure 5. Gate Threshold Variation with Temperature

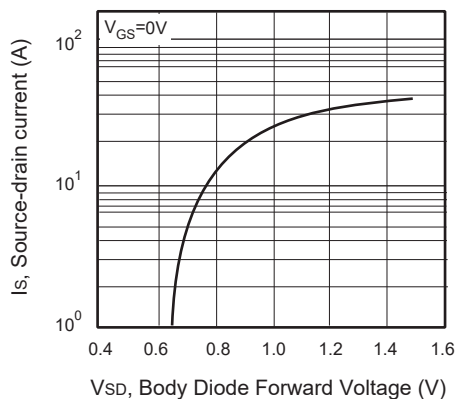


Figure 6. Body Diode Forward Voltage Variation with Source Current



# CEP38N65SA/CEB38N65SA CEF38N65SA

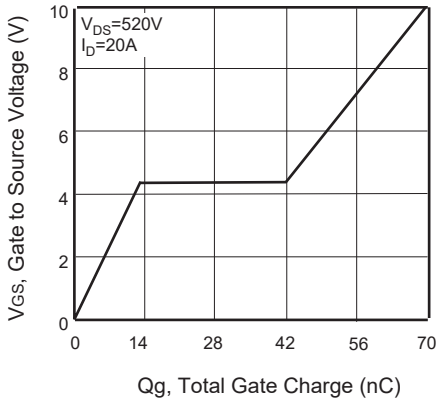


Figure 7. Gate Charge

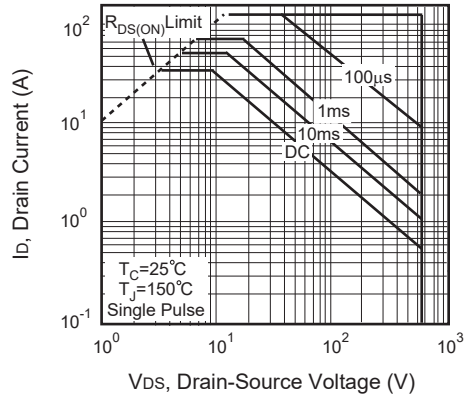


Figure 8. Maximum Safe Operating Area

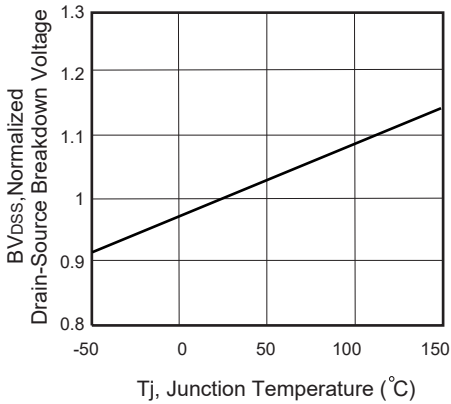


Figure 9. Breakdown Voltage Variation VS Temperature

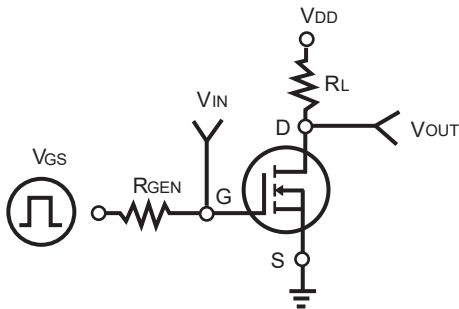


Figure 10. Switching Test Circuit

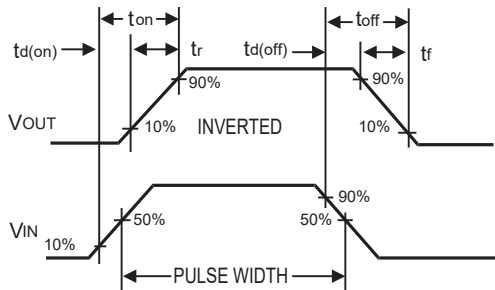


Figure 11. Switching Waveforms



# CEP38N65SA/CEB38N65SA CEF38N65SA

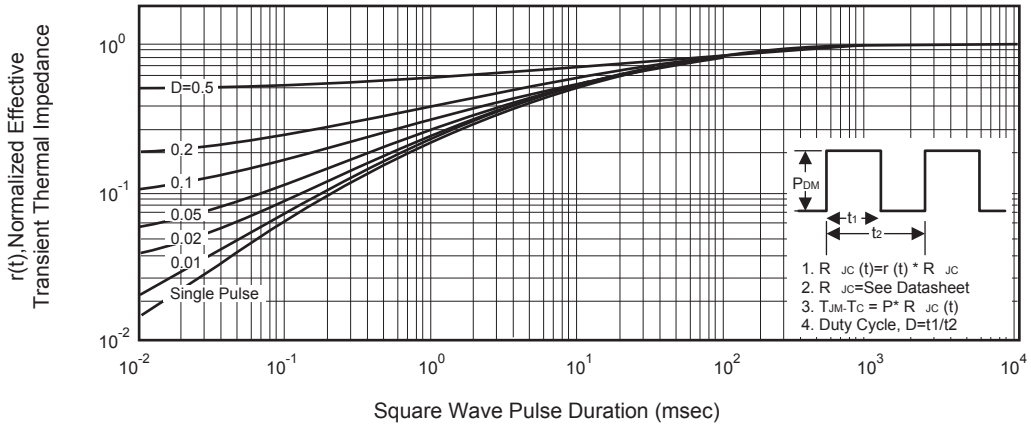


Figure 12. Normalized Thermal Transient Impedance Curve