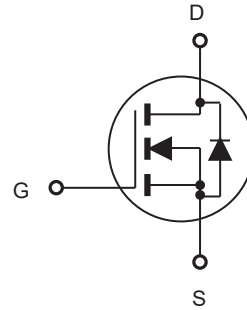
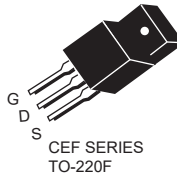


## N-Channel Enhancement Mode Field Effect Transistor

### FEATURES

Type	V <sub>DSS</sub>	R <sub>DS(ON)</sub>	I <sub>D</sub>	@V <sub>GS</sub>
CEP13N5B	500V	0.46Ω	13.5A	10V
CEB13N5B	500V	0.46Ω	13.5A	10V
CEF13N5B	500V	0.46Ω	13.5A <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>	500		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>	13.5	13.5 <sup>d</sup>	A
		8.5	8.5 <sup>d</sup>	A
Drain Current-Pulsed <sup>a</sup>	I <sub>DM</sub> <sup>e</sup>	54	54 <sup>d</sup>	A
Maximum Power Dissipation @ T <sub>C</sub> = 25°C - Derate above 25°C	P <sub>D</sub>	208	52	W
		1.66	0.42	W/°C
Single Pulsed Avalanche Energy <sup>h</sup>	E <sub>AS</sub>	542		mJ
Single Pulsed Avalanche Current <sup>h</sup>	I <sub>AS</sub>	8.5		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>	0.6	2.4	°C/W
Thermal Resistance, Junction-to-Ambient	R <sub>θJA</sub>	62.5	65	°C/W



# CEP13N5B/CEB13N5B CEF13N5B

## 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	$BV_{DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	500			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 500V, V_{GS} = 0V$			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		4	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 6.5A$		0.39	0.46	$\Omega$
<b>Dynamic Characteristics<sup>c</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0\text{ MHz}$		1600		pF
Output Capacitance	$C_{oss}$			215		pF
Reverse Transfer Capacitance	$C_{rss}$			5		pF
<b>Switching Characteristics<sup>c</sup></b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 250V, I_D = 13A,$ $V_{GS} = 10V, R_{GEN} = 25\Omega$		39		ns
Turn-On Rise Time	$t_r$			21		ns
Turn-Off Delay Time	$t_{d(off)}$			102		ns
Turn-Off Fall Time	$t_f$			28		ns
Total Gate Charge	$Q_g$	$V_{DS} = 400V, I_D = 13A,$ $V_{GS} = 10V$		38		nC
Gate-Source Charge	$Q_{gs}$			8		nC
Gate-Drain Charge	$Q_{gd}$			14		nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Drain-Source Diode Forward Current	$I_S^f$				13.5	A
Drain-Source Diode Forward Voltage <sup>b</sup>	$V_{SD}$	$V_{GS} = 0V, I_S = 13.5A^g$			1.4	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 $I_{S(max)} = 6.7A$ . g.Full package $V_{SD}$ test condition $I_S = 6.7A$ . h.L = 15mH, $I_{AS} = 8.5A, V_{DD} = 50V, R_G = 25\Omega$ , Starting $T_J = 25\text{ C}$ .						



# CEP13N5B/CEB13N5B CEF13N5B

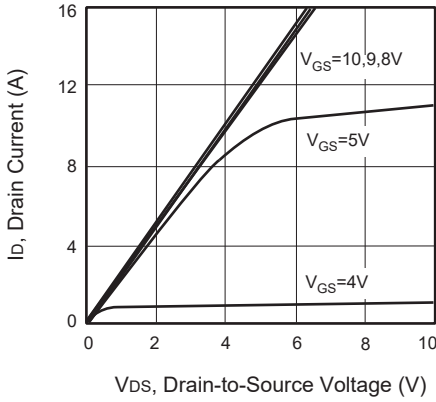


Figure 1. Output Characteristics

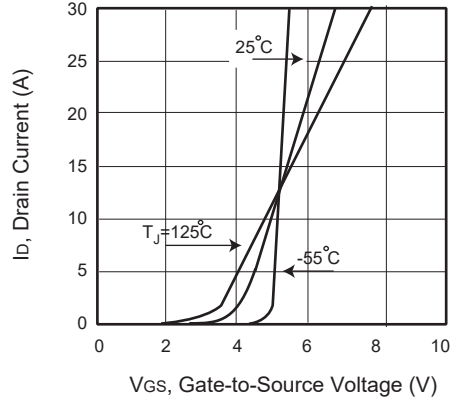


Figure 2. Transfer Characteristics

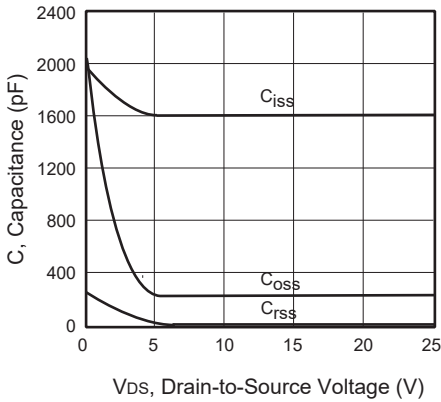


Figure 3. Capacitance

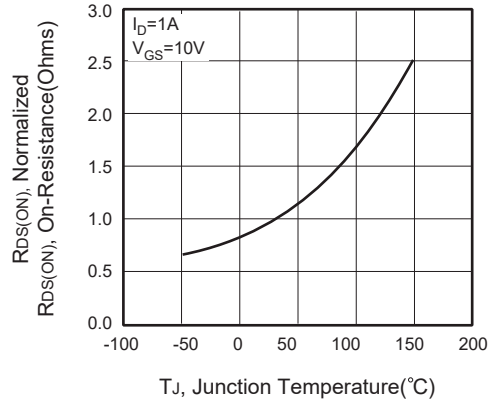


Figure 4. On-Resistance Variation with Temperature

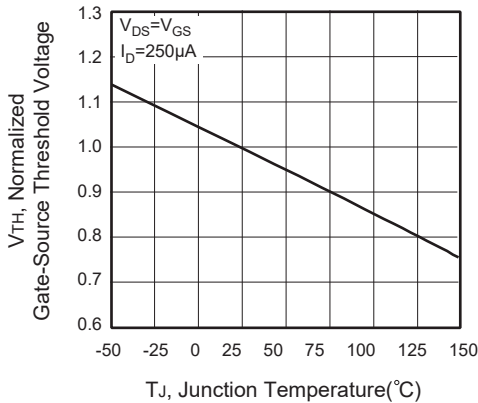


Figure 5. Gate Threshold Variation with Temperature

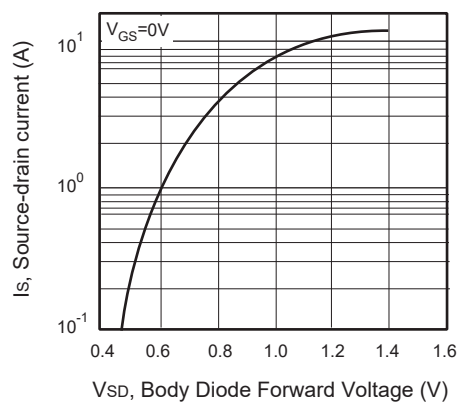


Figure 6. Body Diode Forward Voltage Variation with Source Current

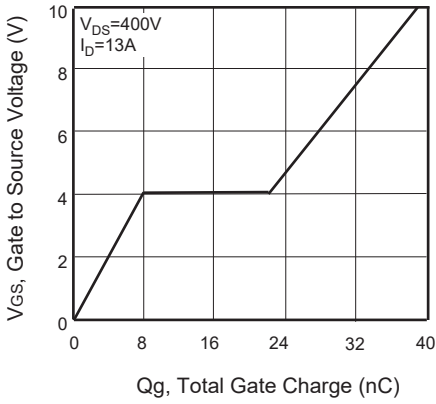


Figure 7. Gate Charge

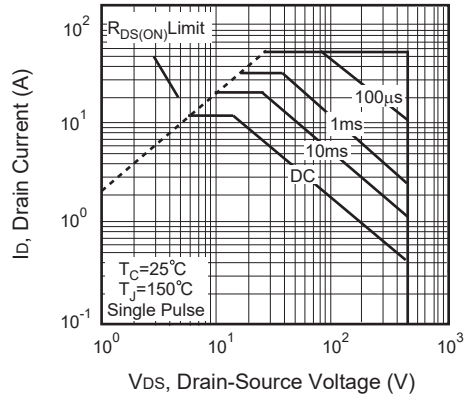


Figure 8. Maximum Safe Operating Area

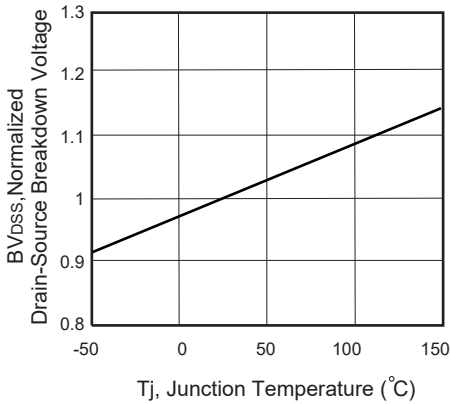


Figure 9. Breakdown Voltage Variation VS Temperature

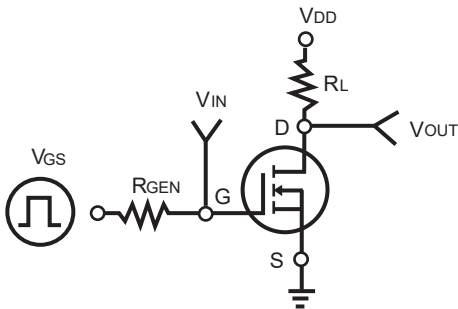


Figure 10. Switching Test Circuit

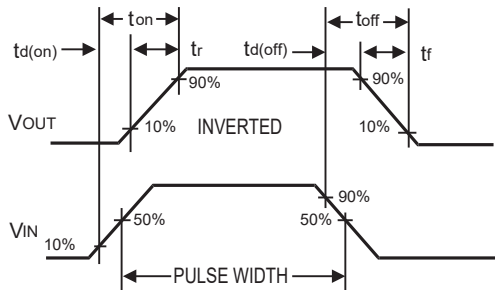


Figure 11. Switching Waveforms



# CEP13N5B/CEB13N5B CEF13N5B

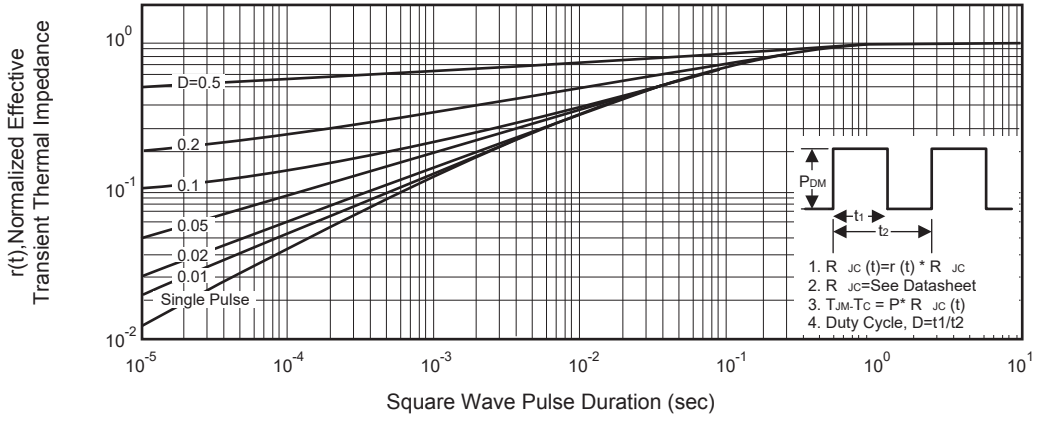


Figure 12. Normalized Thermal Transient Impedance Curve