



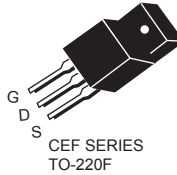
# CEP05N65/CEB05N65 CEF05N65

## 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>
CEP05N65	650V	2.4Ω	4.5A	10V
CEB05N65	650V	2.4Ω	4.5A	10V
CEF05N65	650V	2.4Ω	4.5A <sup>d</sup>	10V

- Super high dense cell design for extremely low R<sub>DS(ON)</sub>.
- 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 <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>	4.5	4.5 <sup>d</sup>	A
		2.9	2.9 <sup>d</sup>	A
Drain Current-Pulsed <sup>a</sup>	I <sub>DM</sub>	18	18 <sup>d</sup>	A
Maximum Power Dissipation @ T <sub>C</sub> = 25 °C - Derate above 25 °C	P <sub>D</sub>	84	40	W
		0.67	0.32	W/°C
Single Pulsed Avalanche Energy <sup>e</sup>	E <sub>AS</sub>	43		mJ
Single Pulsed Avalanche Current <sup>e</sup>	I <sub>AS</sub>	3.5		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>	1.5	3.8	°C/W
Thermal Resistance, Junction-to-Ambient	R <sub>θJA</sub>	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
<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	$I_{DSS}$	$V_{DS} = 650V, V_{GS} = 0V$			25	$\mu A$
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	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 2A$		2	2.4	$\Omega$
<b>Dynamic Characteristics<sup>c</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 25V, V_{GS} = 0V, f = 1.0\text{ MHz}$		590		pF
Output Capacitance	$C_{oss}$			85		pF
Reverse Transfer Capacitance	$C_{rss}$			20		pF
<b>Switching Characteristics<sup>c</sup></b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 300V, I_D = 4.5A, V_{GS} = 10V, R_{GEN} = 25\Omega$		17	34	ns
Turn-On Rise Time	$t_r$			16	32	ns
Turn-Off Delay Time	$t_{d(off)}$			47	94	ns
Turn-Off Fall Time	$t_f$			17.5	35	ns
Total Gate Charge	$Q_g$	$V_{DS} = 480V, I_D = 4.5A, V_{GS} = 10V$		13	17	nC
Gate-Source Charge	$Q_{gs}$			2		nC
Gate-Drain Charge	$Q_{gd}$			5		nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Drain-Source Diode Forward Current	$I_S$				4.5	A
Drain-Source Diode Forward Voltage <sup>b</sup>	$V_{SD}$	$V_{GS} = 0V, I_S = 2A$			1.5	V
<b>Notes :</b> a.Repetitive Rating : Pulse width limited by maximum junction temperature. b.Pulse Test : Pulse Width < 300 $\mu s$ , Duty Cycle < 2%. c.Guaranteed by design, not subject to production testing. d.Limited only by maximum temperature allowed. e.L = 7mH, $I_{AS} = 3.5A, V_{DD} = 50V, R_G = 25\Omega$ , Starting $T_J = 25^\circ\text{C}$ .						



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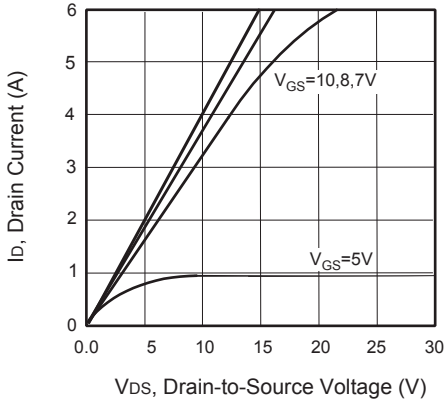


Figure 1. Output Characteristics

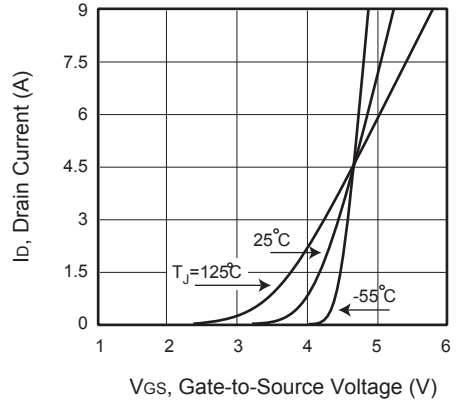


Figure 2. Transfer Characteristics

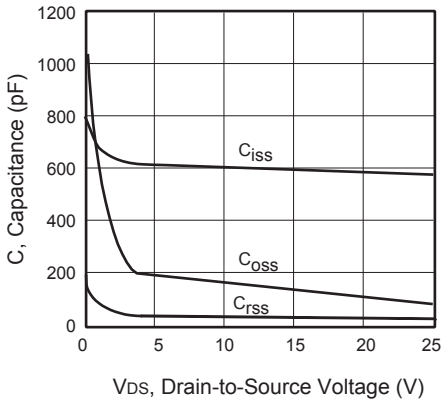


Figure 3. Capacitance

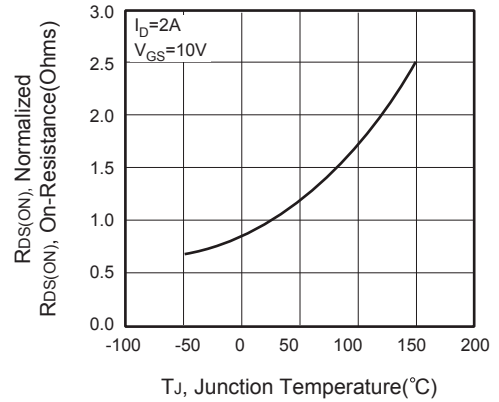


Figure 4. On-Resistance Variation with Temperature



Figure 5. Gate Threshold Variation with Temperature

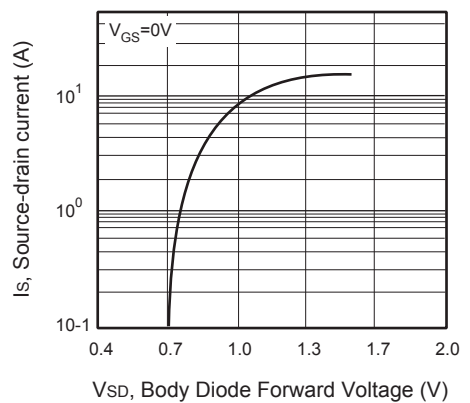


Figure 6. Body Diode Forward Voltage Variation with Source Current



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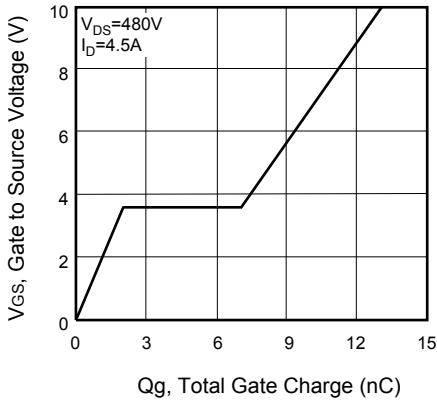


Figure 7. Gate Charge

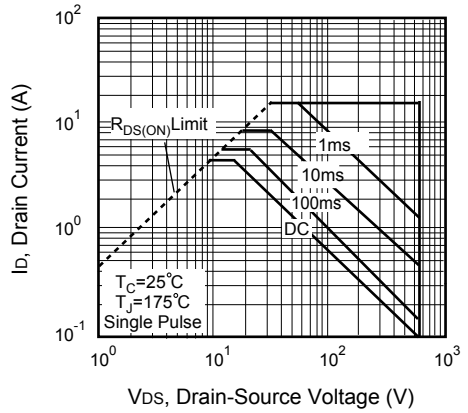


Figure 8. Maximum Safe Operating Area

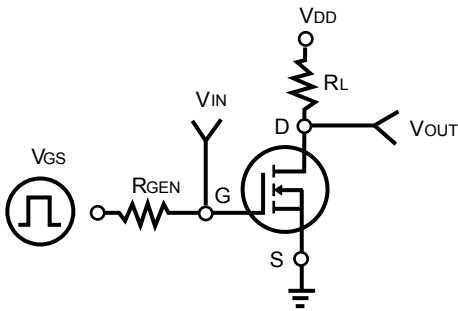


Figure 9. Switching Test Circuit

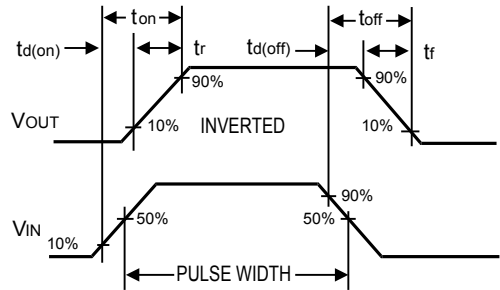


Figure 10. Switching Waveforms

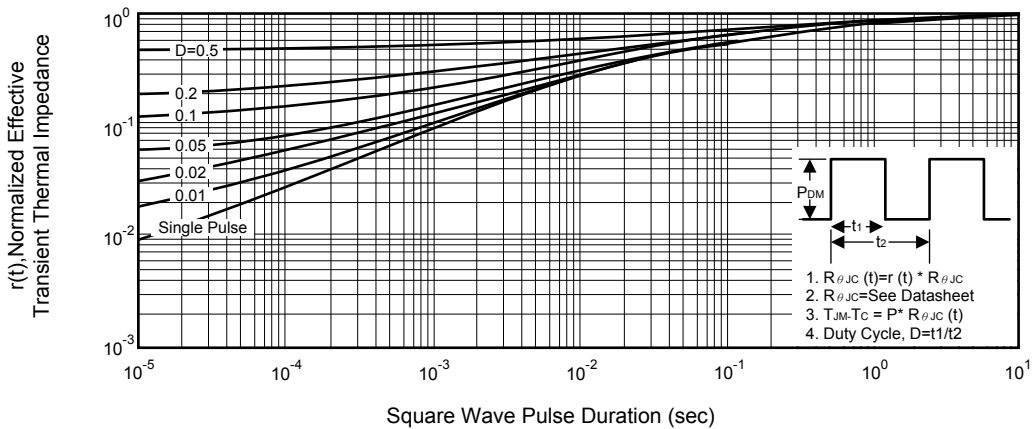


Figure 11. Normalized Thermal Transient Impedance Curve