



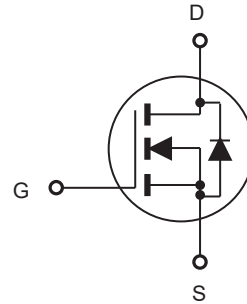
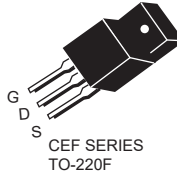
CEP13N65S/CEB13N65S CEF13N65S

N-Channel Enhancement Mode Field Effect Transistor

FEATURES

Type	$V_{DS}@T_{Jmax}$	$R_{DS(ON)}$	I_D	@ V_{GS}
CEP13N65S	700V	0.32Ω	13.8A	10V
CEB13N65S	700V	0.32Ω	13.8A	10V
CEF13N65S	700V	0.32Ω	13.8A ^d	10V

- Super high dense cell design for extremely low $R_{DS(ON)}$.
- 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_{DS}	650		V
Gate-Source Voltage	V_{GS}	±30		V
Drain Current-Continuous @ $T_C = 25^\circ\text{C}$ @ $T_C = 100^\circ\text{C}$	I_D	13.8	13.8 ^d	A
		6.2	6.2 ^d	A
Drain Current-Pulsed ^a	I_{DM}^e	55.2	55.2 ^d	A
Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$ - Derate above 25°C	P_D	160	60	W
		1.28	0.48	W/ $^\circ\text{C}$
Single Pulsed Avalanche Energy ^h	E_{AS}	306		mJ
Single Pulsed Avalanche Current ^h	I_{AS}	3.5		A
Operating and Store Temperature Range	T_J, T_{stg}	-55 to 150		$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Limit		Units
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.78	2.1	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	65	$^\circ\text{C}/\text{W}$



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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	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	2.5		4.5	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 6A$		0.27	0.32	Ω
Dynamic Characteristics^c						
Input Capacitance	C_{iss}	$V_{DS} = 150V, V_{GS} = 0V,$ $f = 1.0\text{ MHz}$		910		pF
Output Capacitance	C_{oss}			60		pF
Reverse Transfer Capacitance	C_{rss}			15		pF
Switching Characteristics^c						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 400V, I_D = 6A,$ $V_{GS} = 10V, R_{GEN} = 10\Omega$		30		ns
Turn-On Rise Time	t_r			13		ns
Turn-Off Delay Time	$t_{d(off)}$			65		ns
Turn-Off Fall Time	t_f			11		ns
Total Gate Charge	Q_g	$V_{DS} = 400V, I_D = 1A,$ $V_{GS} = 10V$		25		nC
Gate-Source Charge	Q_{gs}			4		nC
Gate-Drain Charge	Q_{gd}			10		nC
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Current	I_S^f				15	A
Drain-Source Diode Forward Voltage ^b	V_{SD}	$V_{GS} = 0V, I_S = 6A^g$			1.2	V
Reverse Recovery Time	T_{rr}	$I_D = 6A, di/dt = 100A/\mu s$		240		ns
Reverse Recovery Charge	Q_{rr}			2.35		μC
Peak Reverse Recovery Current	I_{rr}			16.8		A
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 $I_{S(max)} = 8.6A$. g.Full package V_{SD} test condition $I_S = 8.6A$. h.L = 50mH, $I_{AS} = 3.5A, V_{DD} = 50V, R_G = 25\Omega$, Starting $T_J = 25\text{ C}$.						



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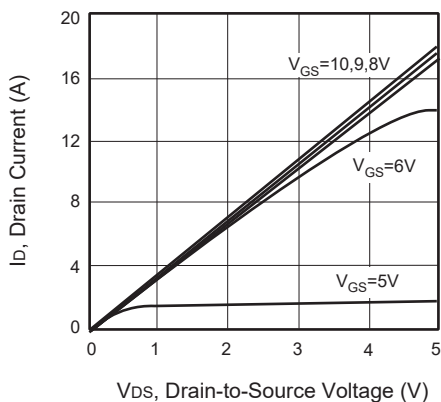


Figure 1. Output Characteristics

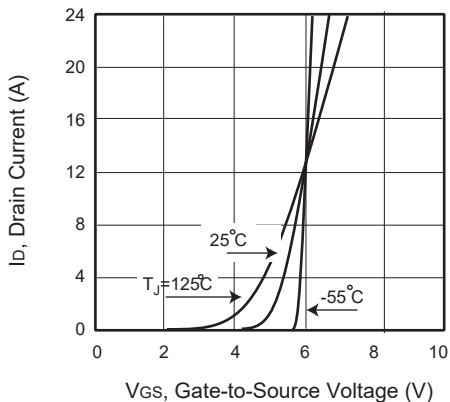


Figure 2. Transfer Characteristics

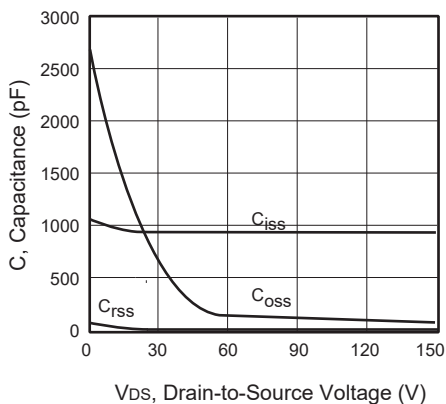


Figure 3. Capacitance

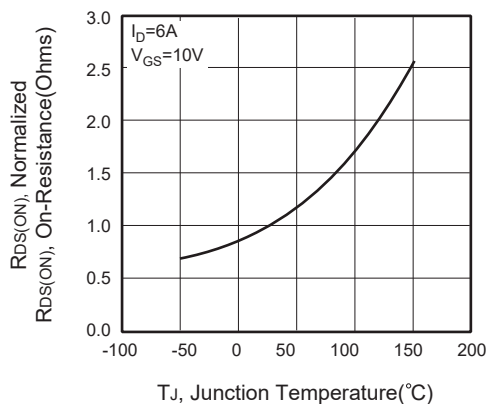


Figure 4. On-Resistance Variation with Temperature

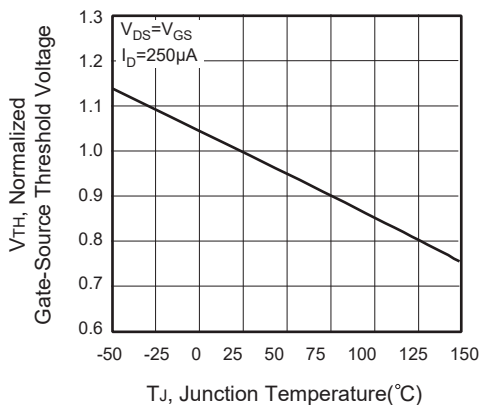


Figure 5. Gate Threshold Variation with Temperature

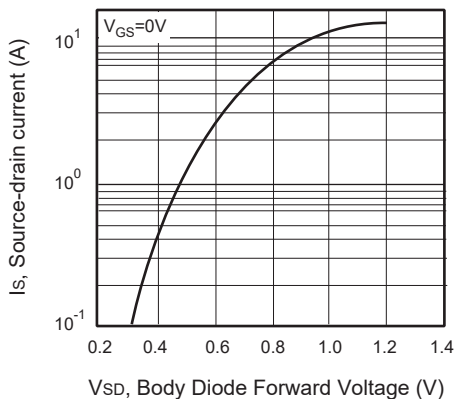


Figure 6. Body Diode Forward Voltage Variation with Source Current

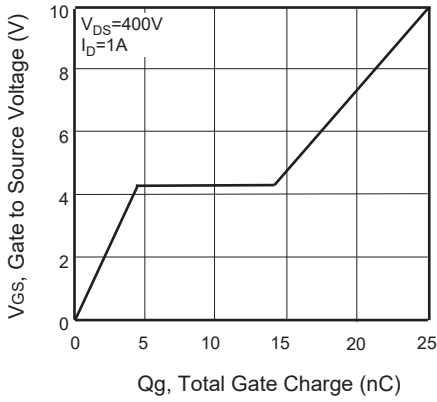


Figure 7. Gate Charge

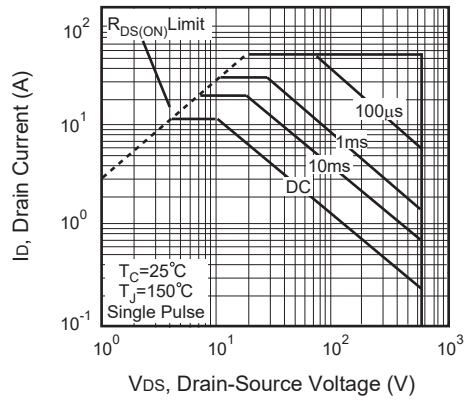


Figure 8. Maximum Safe Operating Area

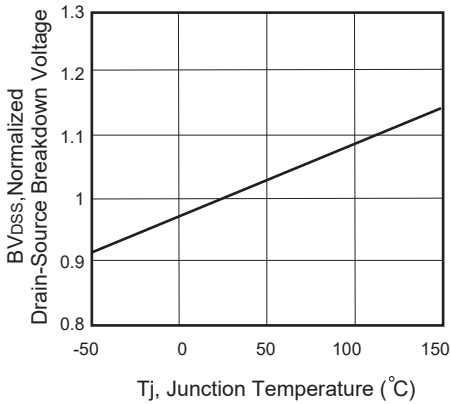


Figure 9. Breakdown Voltage Variation VS Temperature

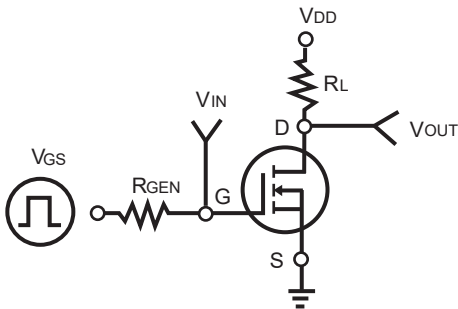


Figure 10. Switching Test Circuit

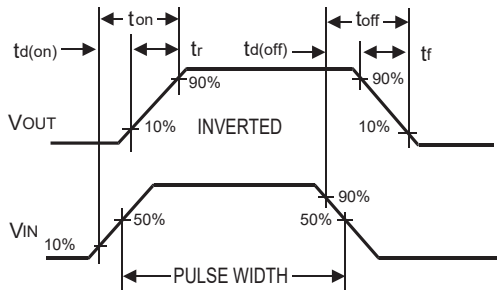


Figure 11. Switching Waveforms



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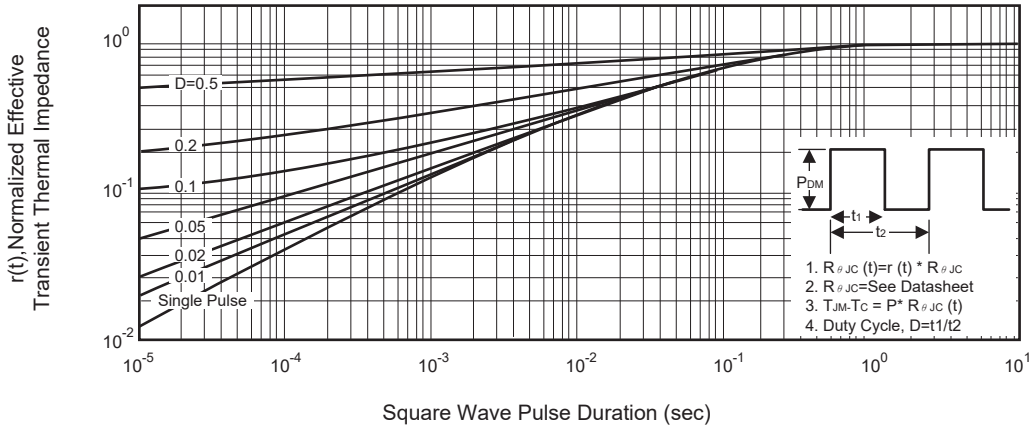


Figure 12. Normalized Thermal Transient Impedance Curve