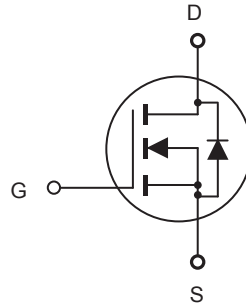


## N-Channel Enhancement Mode Field Effect Transistor

### FEATURES

- 650V, 3.2A,  $R_{DS(ON)} = 2.8\Omega$  @  $V_{GS} = 10V$ .
- Super high dense cell design for extremely low  $R_{DS(ON)}$ .
- High power and current handling capability.
- Lead-free plating ; RoHS compliant.
- TO-251 & TO-252 package.



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

Parameter	Symbol	Limit	Units
Drain-Source Voltage	$V_{DS}$	650	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Drain Current-Continuous @ $T_C = 25^\circ\text{C}$ @ $T_C = 100^\circ\text{C}$	$I_D$	3.2	A
		2	A
Drain Current-Pulsed <sup>a</sup>	$I_{DM}$	12.8	A
Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$ - Derate above $25^\circ\text{C}$	$P_D$	70	W
		0.56	W/ $^\circ\text{C}$
Single Pulsed Avalanche Energy <sup>d</sup>	$E_{AS}$	220	mJ
Single Pulsed Avalanche Current <sup>d</sup>	$I_{AS}$	4.2	A
Operating and Store Temperature Range	$T_J, T_{stg}$	-55 to 150	$^\circ\text{C}$

### Thermal Characteristics

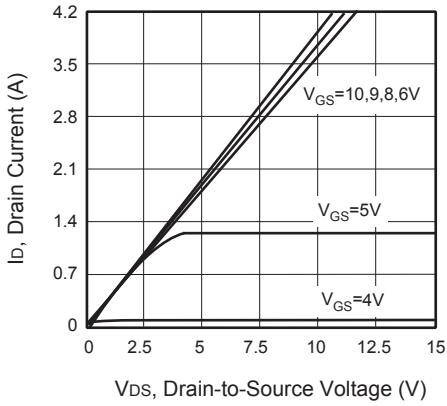
Parameter	Symbol	Limit	Units
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.8	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	50	$^\circ\text{C/W}$



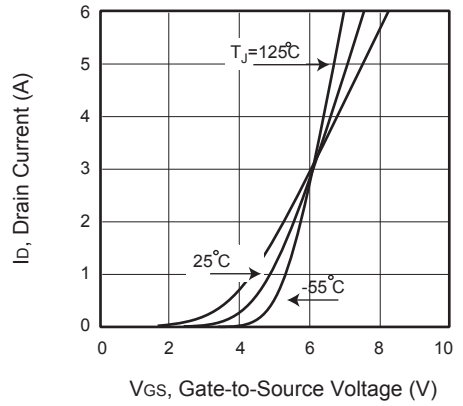
# CED04N65/CEU04N65

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

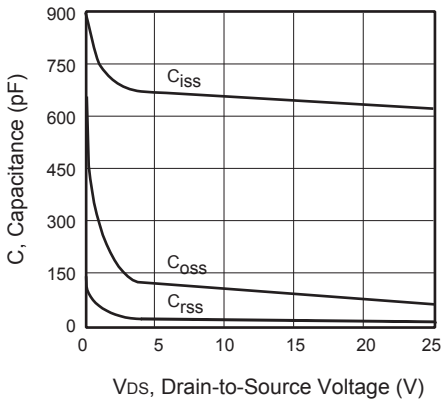
Parameter	Symbol	Test Condition	Min	Typ	Max	Units
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	650			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 650V, V_{GS} = 0V$			1	$\mu A$
Gate Body Leakage Current, Forward	$I_{GSSF}$	$V_{GS} = 30V, V_{DS} = 0V$			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		4	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 1.6A$		2.3	2.8	$\Omega$
<b>Dynamic Characteristics<sup>c</sup></b>						
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
<b>Switching Characteristics<sup>c</sup></b>						
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
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Drain-Source Diode Forward Current	$I_S$				3.2	A
Drain-Source Diode Forward Voltage <sup>b</sup>	$V_{SD}$	$V_{GS} = 0V, I_S = 3.2A$			1.2	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.L = 25mH, $I_{AS} = 4.2A, V_{DD} = 50V, R_G = 25\Omega$ , Starting $T_J = 25\text{ C}$						



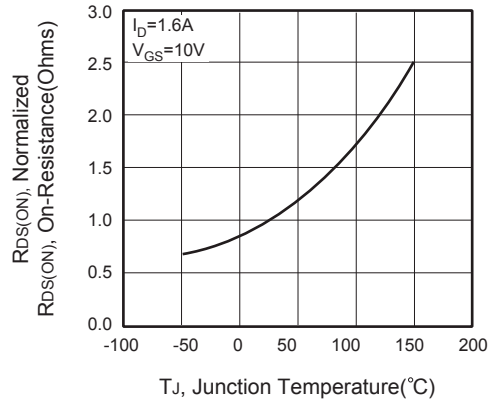
**Figure 1. Output Characteristics**



**Figure 2. Transfer Characteristics**



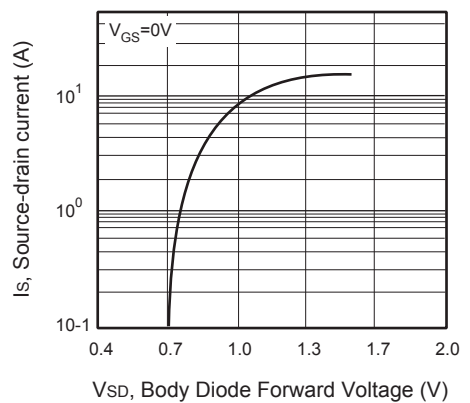
**Figure 3. Capacitance**



**Figure 4. On-Resistance Variation with Temperature**



**Figure 5. Gate Threshold Variation with Temperature**



**Figure 6. Body Diode Forward Voltage Variation with Source Current**

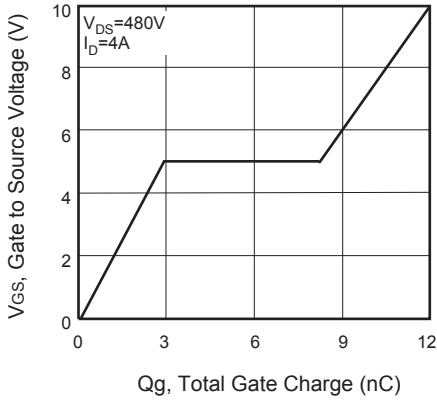


Figure 7. Gate Charge

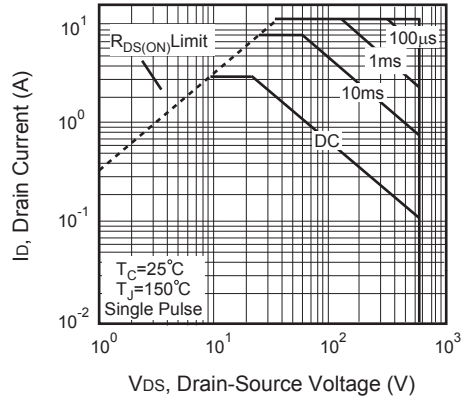


Figure 8. Maximum Safe Operating Area

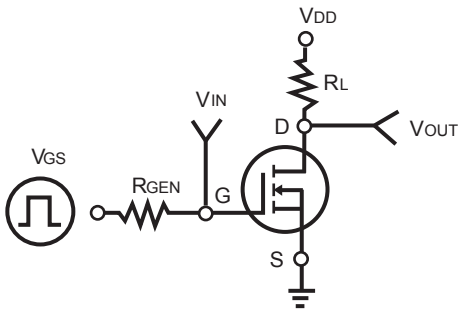


Figure 9. Switching Test Circuit



Figure 10. Switching Waveforms

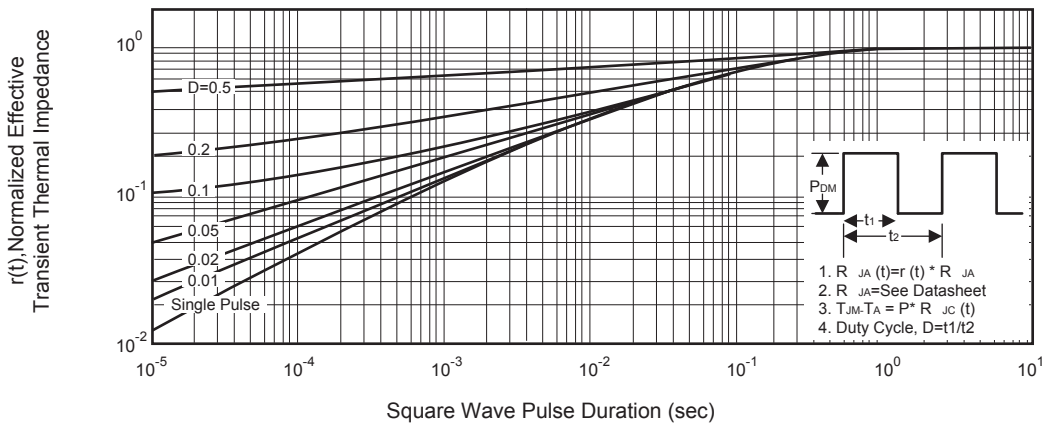


Figure 11. Normalized Thermal Transient Impedance Curve