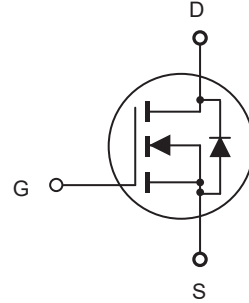# CED22N60S/CEU22N60S

CET

N-Channel Enhancement Mode Field Effect Transistor

FEATURES

■ 650V@$T_{J\,max}$, 19A, $R_{DS(ON)}$ = 130mΩ @V_{GS} = 10V.

■ Super high dense cell design for extremely low $R_{DS(ON)}$.

■ High power and current handing capability.

■ Pb-free lead plating ; RoHS compliant.

■ Halogen Free.

■ TO-251 & TO-252 package.

APPLICATIONS

■ PC Power.

■ EV Charging.

■ Telecom.

■ Server.

■ SMPS.

CEU SERIES
TO-252(D-PAK)

CED SERIES
TO-251(I-PAK)

ABSOLUTE MAXIMUM RATINGS T_C = 25°C unless otherwise noted

Parameter	Symbol	Limit	Units
Drain-Source Voltage	V_{DS}	600	V
Gate-Source Voltage	V_{GS}	±30	V
Drain Current-Continuous @ T_C = 25°C	I_D	19	A
@ T_C = 100°C		12	A
Drain Current-Pulsed [a]	I_{DM}	76	A
Maximum Power Dissipation @ T_C = 25°C	P_D	125	W
- Derate above 25°C		1	W/$^\circ$C
Single Pulsed Avalanche Energy [d]	E_{AS}	70	mJ
Single Pulsed Avalanche Current [d]	I_{AS}	4.2	A
Operating and Store Temperature Range	T_J,T_{stg}	-55 to 150	$^\circ$C

Thermal Characteristics

Parameter	Symbol	Limit	Units
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1	$^\circ$C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	50	$^\circ$C/W

CED22N60S/CEU22N60S

Electrical Characteristics $T_C = 25°C$ unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	600			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 600V, V_{GS} = 0V$			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	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	3		5	V
Static Drain-Source	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 6.8A$		108	130	mΩ
Gate Input Resistance	R_g	f=1MHz,open Drain		7.3		Ω
Dynamic Characteristics [c]						
Input Capacitance	C_{iss}	$V_{DS} = 150V, V_{GS} = 0V,$ f = 1.0 MHz		1600		pF
Output Capacitance	C_{oss}			70		pF
Reverse Transfer Capacitance	C_{rss}			10		pF
Switching Characteristics [c]						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 300V, I_D = 6A,$ $V_{GS} = 10V, R_{GEN} = 6Ω$		34		ns
Turn-On Rise Time	t_r			8		ns
Turn-Off Delay Time	$t_{d(off)}$			80		ns
Turn-Off Fall Time	t_f			8		ns
Total Gate Charge	Q_g	$V_{DS} = 300V, I_D = 6A,$ $V_{GS} = 10V$		39		nC
Gate-Source Charge	Q_{gs}			9		nC
Gate-Drain Charge	Q_{gd}			16		nC
Drain-Source Diode Characteristics and Maximun Ratings						
Drain-Source Diode Forward Current	I_S				19	A
Drain-Source Diode Forward Voltage [b]	V_{SD}	$V_{GS} = 0V, I_S = 6A$			1.5	V
Reverse Recovery Time	T_{rr}	$I_F = 6A, di/dt = 100A/us$		205		ns
Reverse Recovery Charge	Q_{rr}			2		uC
Peak Reverse Recovery Current	I_{rr}			21		A

Notes :
a.Repetitive Rating : Pulse width limited by maximum junction temperature.
b.Pulse Test : Pulse Width ≤ 300µs, Duty Cycle ≤ 2%.
c.Guaranteed by design, not subject to production testing.
d.L = 8mH, $I_{AS} = 4.2A$, $V_{DD} = 50V$, $R_G = 25Ω$, Starting $T_J = 25°C$.

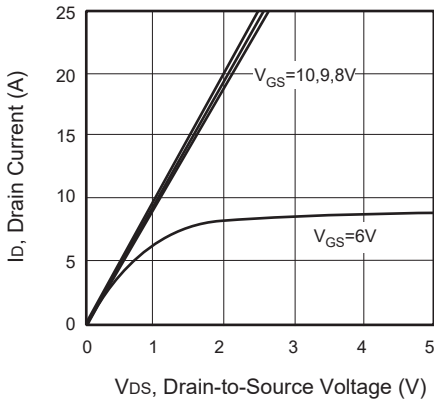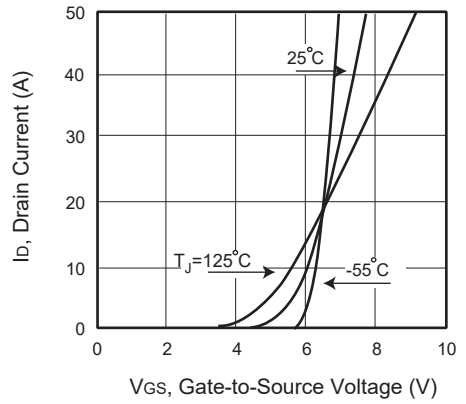**Figure 1. Output Characteristics**

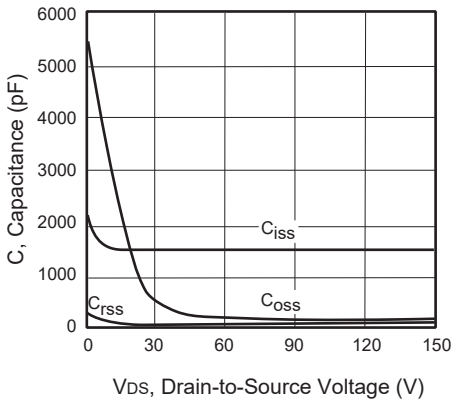**Figure 2. Transfer Characteristics**
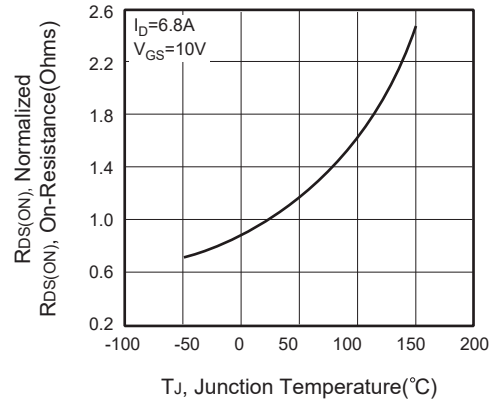

Figure 3. Capacitance

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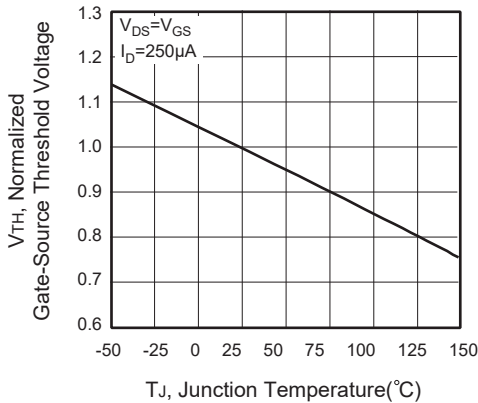with Temperature**

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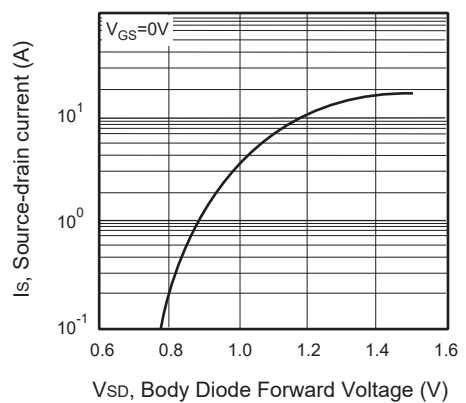with Temperature**

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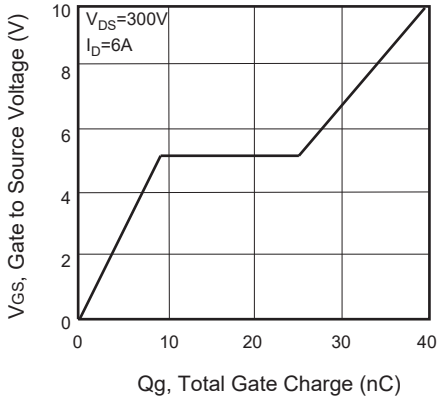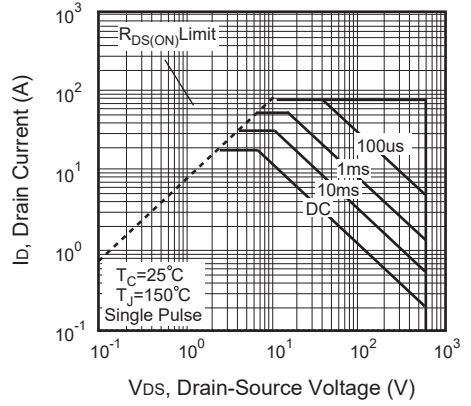Variation with Source Current**

Figure 7. Gate Charge

Figure 8. Maximum Safe
Operating Area

Figure 9. Breakdown Voltage Variation
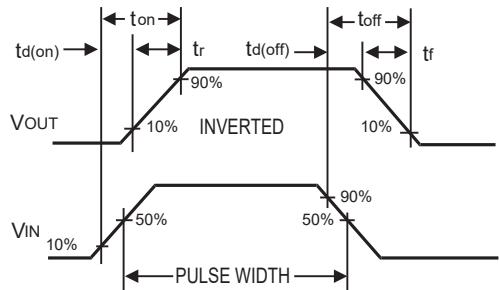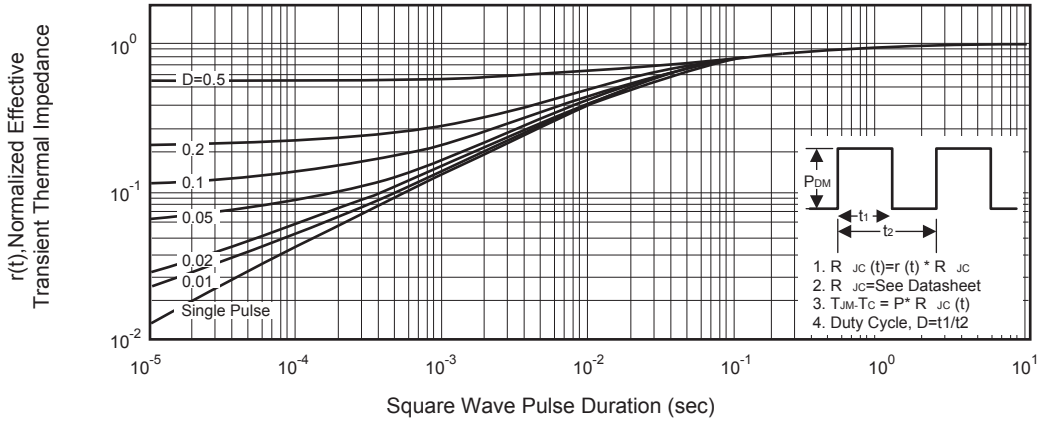VS Temperature

Figure 10. Switching Test Circuit

Figure 11. Switching Waveforms

Figure 12. Normalized Thermal Transient Impedance Curve