CED11P20A/CEU11P20A

**P-Channel Enhancement Mode Field Effect Transistor**

FEATURES

■ -200V, -11.2A, $R_{DS(ON)}$ = 275 mΩ   @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.

CEU SERIES
TO-252(D-PAK)

CED SERIES
TO-251(I-PAK)
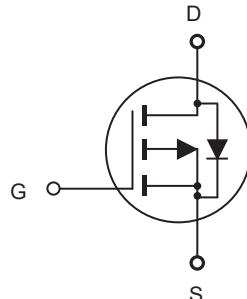
ABSOLUTE MAXIMUM RATINGS T_C = 25°C unless otherwise noted

Parameter	Symbol	Limit	Units
Drain-Source Voltage	V_{DS}	-200	V
Gate-Source Voltage	V_{GS}	±30	V
Drain Current-Continuous @ T_C = 25°C	I_D	-11.2	A
@ T_C = 100°C		-7.1	A
Drain Current-Pulsed [a]	I_{DM}	-44.8	A
Maximum Power Dissipation @ T_C = 25°C	P_D	69.4	W
- Derate above 25°C		0.55	W/$^\circ$C
Single Pulsed Avalanche Energy [d]	E_{AS}	181	mJ
Single Pulsed Avalanche Current [d]	I_{AS}	11	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	$R_{\theta JC}$	1.8	$^\circ$C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	50	$^\circ$C/W

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 = -250µA	-200			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = -200V, 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 = -250µA	-2		-4	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = -10V, I_D = -5A		220	275	mΩ
Dynamic Characteristics [c]						
Input Capacitance	C_{iss}	V_{DS} = -25V, V_{GS} = 0V, f = 1.0 MHz		3790		pF
Output Capacitance	C_{oss}			145		pF
Reverse Transfer Capacitance	C_{rss}			105		pF
Switching Characteristics [c]						
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = -100V, I_D = -6A, V_{GS} = -10V, R_{GEN} = 25Ω		41		ns
Turn-On Rise Time	t_r			38		ns
Turn-Off Delay Time	$t_{d(off)}$			191		ns
Turn-Off Fall Time	t_f			71		ns
Total Gate Charge	Q_g	V_{DS} = -160V, I_D = -6A, V_{GS} = -10V		65		nC
Gate-Source Charge	Q_{gs}			10		nC
Gate-Drain Charge	Q_{gd}			21		nC
Drain-Source Diode Characteristics and Maximun Ratings						
Drain-Source Diode Forward Current	I_S				-11.2	A
Drain-Source Diode Forward Voltage [b]	V_{SD}	V_{GS} = 0V, I_S = -5A			-1.5	V

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 = 3mH, I_{AS} = 11A, V_{DD} = 25V, R_G = 25Ω, Starting T_J = 25°C.
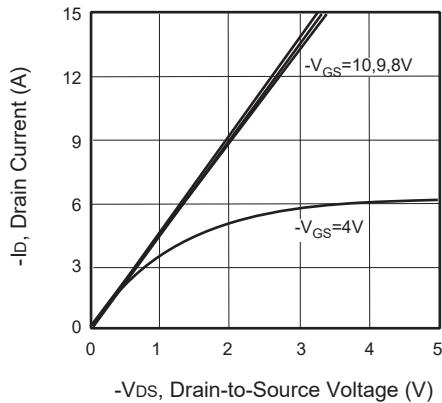
Figure 1. Output Characteristics

X-axis: -V$_{DS}$, Drain-to-Source Voltage (V)
Y-axis: -I$_D$, Drain Current (A)
Curves labeled: -V$_{GS}$=10,9,8V and -V$_{GS}$=4V
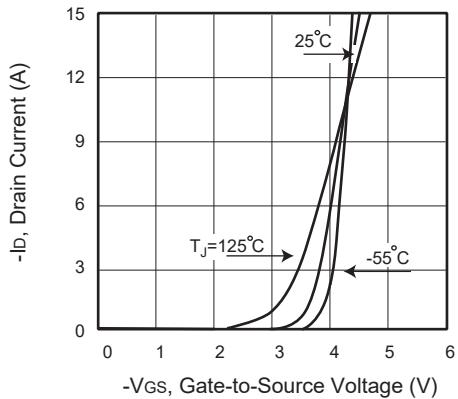
Figure 2. Transfer Characteristics

X-axis: -V$_{GS}$, Gate-to-Source Voltage (V)
Y-axis: -I$_D$, Drain Current (A)
Curves labeled: 25°C, T$_J$=125°C, -55°C

Figure 3. Capacitance

X-axis: -V$_{DS}$, Drain-to-Source Voltage (V)
Y-axis: C, Capacitance (pF)
Curves labeled: C$_{iss}$, C$_{oss}$, C$_{rss}$
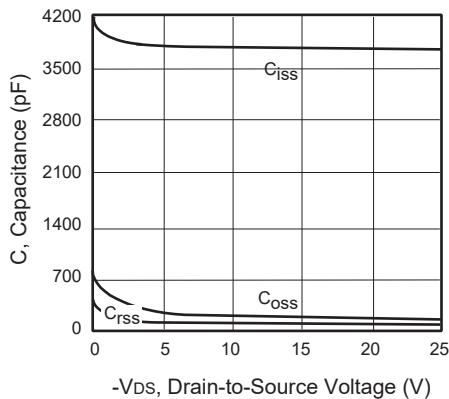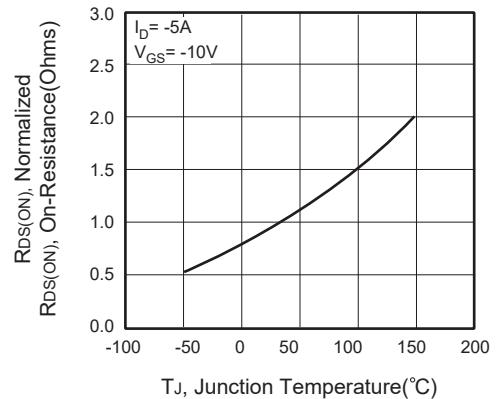
Figure 4. On-Resistance Variation with Temperature

X-axis: T$_J$, Junction Temperature(°C)
Y-axis: R$_{DS(ON)}$, Normalized R$_{DS(ON)}$, On-Resistance(Ohms)
I$_D$= -5A, V$_{GS}$= -10V
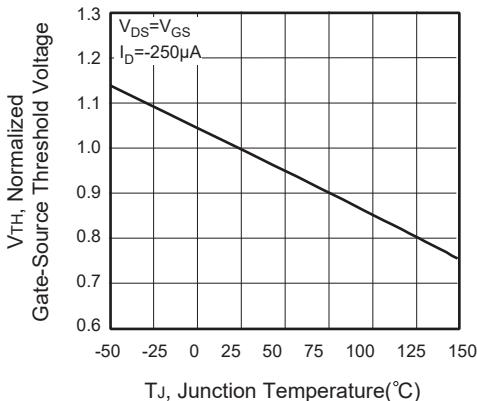
Figure 5. Gate Threshold Variation with Temperature

X-axis: T$_J$, Junction Temperature(°C)
Y-axis: V$_{TH}$, Normalized Gate-Source Threshold Voltage
V$_{DS}$=V$_{GS}$, I$_D$=-250µA
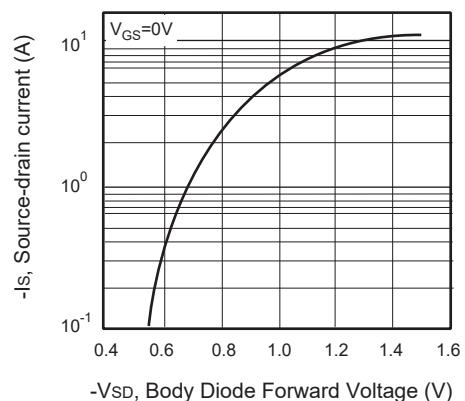
Figure 6. Body Diode Forward Voltage Variation with Source Current

X-axis: -V$_{SD}$, Body Diode Forward Voltage (V)
Y-axis: -I$_S$, Source-drain current (A)
V$_{GS}$=0V
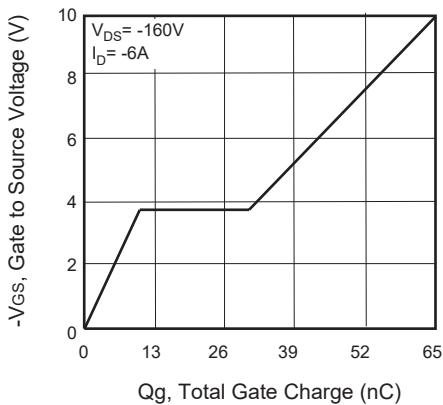
**Figure 7. Gate Charge**

Figure 8. Maximum Safe Operating Area
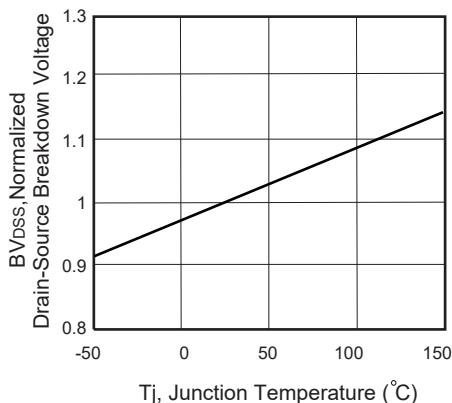
Figure 9. Breakdown Voltage Variation VS Temperature
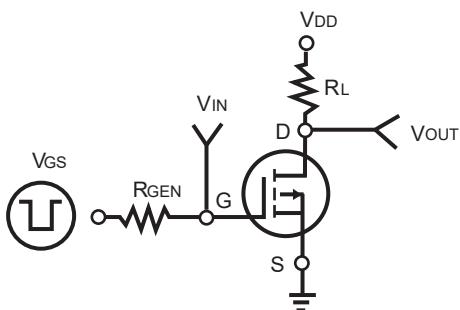

Figure 10. Switching Test Circuit
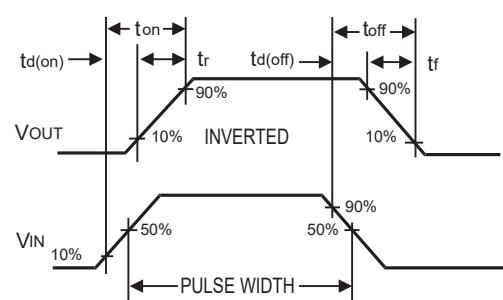

Figure 11. Switching Waveforms

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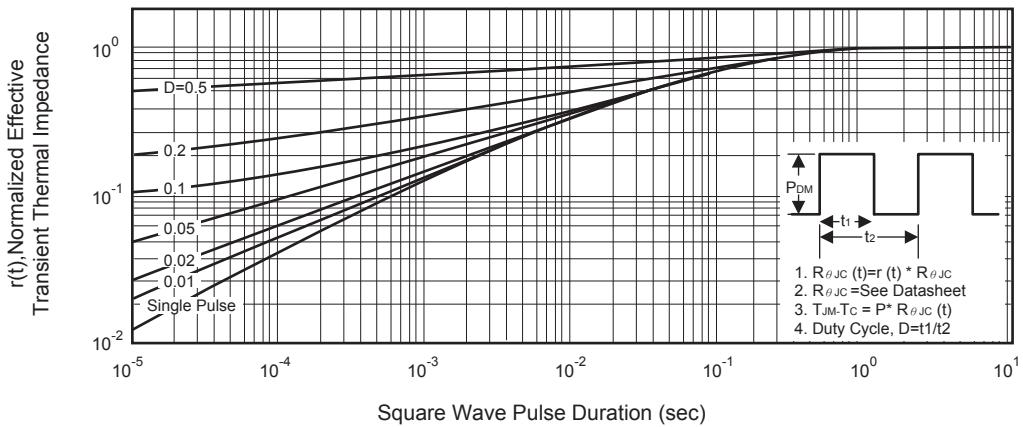
Figure 12. Normalized Thermal Transient Impedance Curve