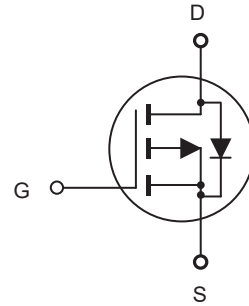# CED3133/CEU3133

P-Channel Enhancement Mode Field Effect Transistor

FEATURES

- -30V, -35A, $R_{DS(ON)}$ = 16mΩ @V_{GS} = -10V.

    $R_{DS(ON)}$ = 27mΩ @V_{GS} = -4.5V.

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

- High power and current handing capability.

- RoHS compliant.

- 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

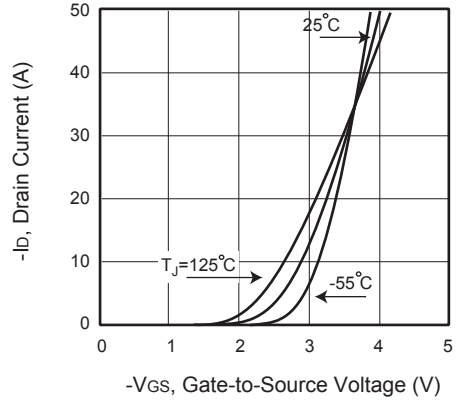| Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	$\pm$25	V
Drain Current-Continuous	I_D	-35	A
Drain Current-Pulsed [a]	I_{DM}	-140	A
Maximum Power Dissipation @ T_C = 25°C	P_D	31	W
- Derate above 25°C		0.25	W/$^\circ$C
Operating and Store Temperature Range	T_J, T_{stg}	-55 to 150	$^\circ$C

Thermal Characteristics

Parameter	Symbol	Limit	Units
Thermal Resistance, Junction-to-Case	R$_{\theta JC}$	4	$^\circ$C/W
Thermal Resistance, Junction-to-Ambient	R$_{\theta JA}$	50	$^\circ$C/W

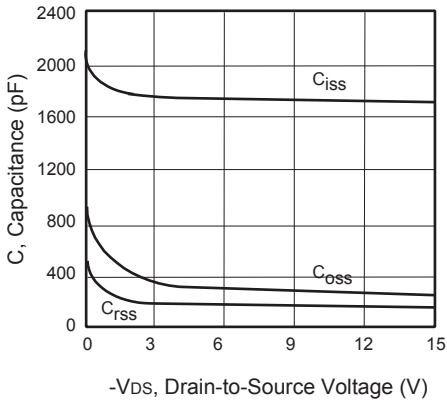## Electrical Characteristics T_C = 25°C unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0V, I_D = -250μA	-30			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = -30V, V_{GS} = 0V			-1	μA
Gate Body Leakage Current, Reverse	I_{GSSR}	V_{GS} = -20V, V_{DS} = 0V			-100	nA
Gate Body Leakage Current, Forward	I_{GSSF}	V_{GS} = 20V, V_{DS} = 0V			100	nA
On Characteristics [c]						
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS} = V_{DS}, I_D = -250μA	-0.8		-2	V
Static Drain-Source	$R_{DS(on)}$	V_{GS} = -10V, I_D = -16A		13	16	mΩ
On-Resistance		V_{GS} = -4.5V, I_D = -8A		21	27	mΩ
Dynamic Characteristics [d]						
Input Capacitance	C_{iss}	V_{DS} = -15V, V_{GS} = 0V, f = 1.0 MHz		1710		pF
Output Capacitance	C_{oss}			260		pF
Reverse Transfer Capacitance	C_{rss}			185		pF
Switching Characteristics [d]						
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = -24V, I_D = -1A, V_{GS} = -10V, R_{GEN} = 6Ω		16		ns
Turn-On Rise Time	t_r			8		ns
Turn-Off Delay Time	$t_{d(off)}$			75		ns
Turn-Off Fall Time	t_f			36		ns
Total Gate Charge	Q_g	V_{DS} = -24V, I_D = -1A, V_{GS} = -4.5V		18		nC
Gate-Source Charge	Q_{gs}			3.4		nC
Gate-Drain Charge	Q_{gd}			7.1		nC
Drain-Source Diode Characteristics and Maximun Ratings						
Drain-Source Diode Forward Current [b]	I_S				-20	A
Drain-Source Diode Forward Voltage [c]	V_{SD}	V_{GS} = 0V, I_S = -8A			-1.5	V

Notes :
a.Repetitive Rating : Pulse width limited by maximum junction temperature.
b.Surface Mounted on FR4 Board, t ≤ 10 sec.
c.Pulse Test : Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
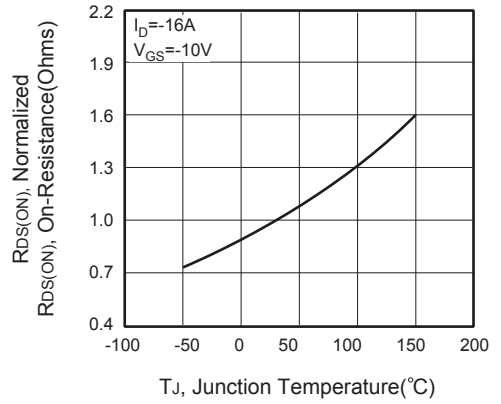d.Guaranteed by design, not subject to production testing.
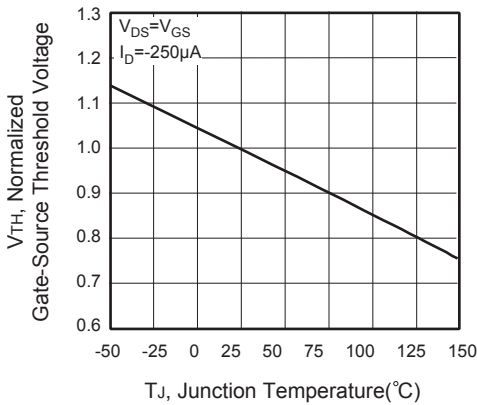
Figure 1. Output Characteristics

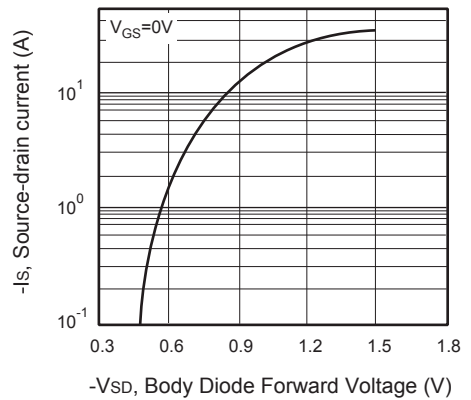**Figure 2. Transfer Characteristics**
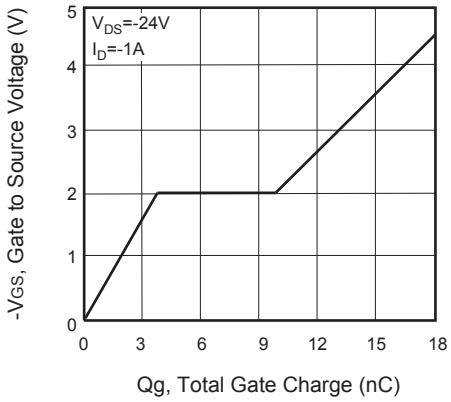
Figure 3. Capacitance

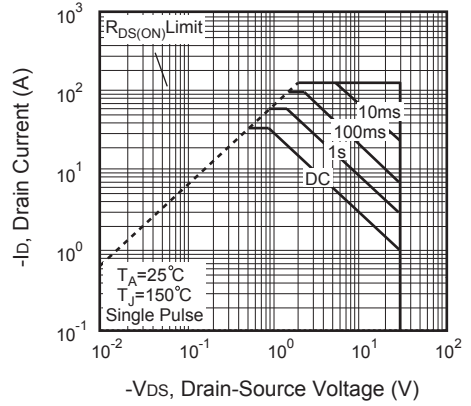**Figure 4. On-Resistance Variation with Temperature**

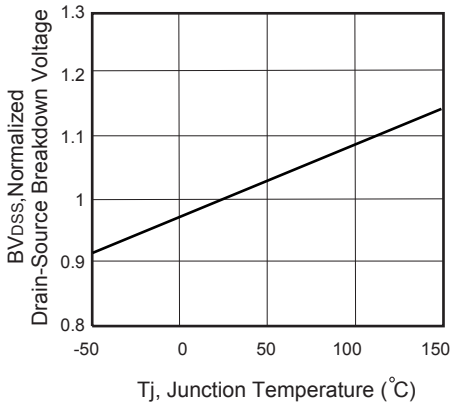**Figure 5. Gate Threshold Variation with Temperature**

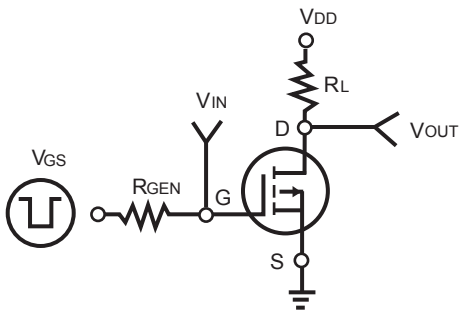**Figure 6. Body Diode Forward Voltage Variation with Source Current**
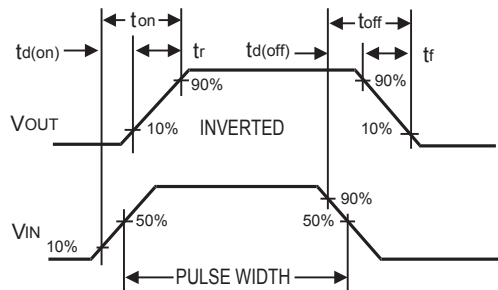
3

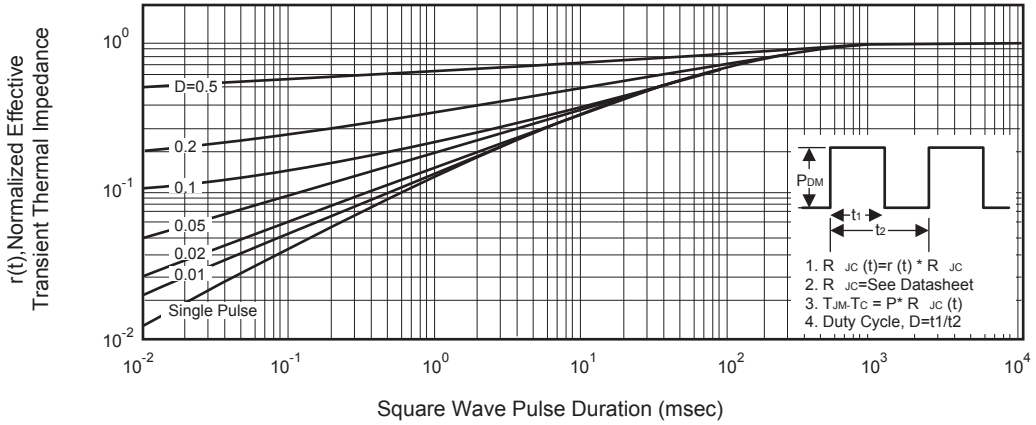Figure 7. Gate Charge

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