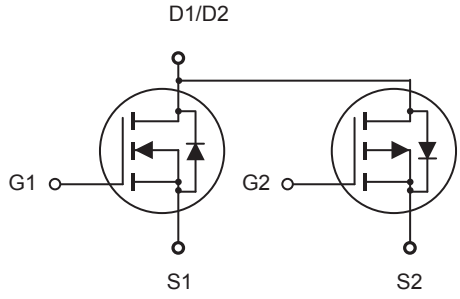
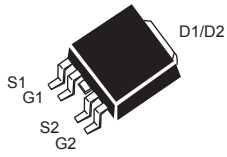
CED4279/CEU4279

Dual Enhancement Mode Field Effect Transistor (N and P Channel)

FEATURES

- 40V , 14A , $R_{DS(ON)}$ = 32mΩ @V_{GS} = 10V.
  $R_{DS(ON)}$ = 46mΩ @V_{GS} = 4.5V.
- -40V , -9A , $R_{DS(ON)}$ = 72mΩ @V_{GS} = 10V.
  $R_{DS(ON)}$ = 110mΩ @V_{GS} = 4.5V.
- Super high dense cell design for extremely low $R_{DS(ON)}$.
- High power and current handing capability.
- Lead free product is acquired.
- TO-252-4L package.





CEU SERIES
TO-252-4L

ABSOLUTE MAXIMUM RATINGS T_C = 25°C unless otherwise noted

Parameter	Symbol	N-Channel	P-Channel	Units
Drain-Source Voltage	V_{DS}	40	40	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Drain Current-Continuous [e]	I_D [e]	14	-9	A
Drain Current-Pulsed [a]	I_{DM}	56	-36	A
Maximum Power Dissipation @ T_C = 25°C	P_D	10.4		W
- Derate above 25°C		0.08		W/°C
Operating and Store Temperature Range	T_J,T_{stg}	-55 to 150		°C

Thermal Characteristics

Parameter	Symbol	Limit	Units
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	12	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	50	°C/W

N-Channel Electrical Characteristics T_A = 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	40			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 40V, V_{GS} = 0V			1	μA
Gate Body Leakage Current, Forward	I_{GSSF}	V_{GS} = 20V, V_{DS} = 0V			100	nA
Gate Body Leakage Current, Reverse	I_{GSSR}	V_{GS} = -20V, V_{DS} = 0V			-100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS} = V_{DS}, I_D = 250μA	1		3	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 8A		25	32	mΩ
		V_{GS} = 4.5V, I_D = 6A		35	46	mΩ
Dynamic Characteristics [d]						
Forward Transconductance	g_{FS} [c]	V_{DS} = 5V, I_D = 8A		10		S
Input Capacitance	C_{iss}	V_{DS} = 20V, V_{GS} = 0V, f = 1.0 MHz		1055		pF
Output Capacitance	C_{oss}			160		pF
Reverse Transfer Capacitance	C_{rss}			100		pF
Switching Characteristics [d]						
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 20V, I_D = 6A, V_{GS} = 10V, R_{GEN} = 3Ω		15	30	ns
Turn-On Rise Time	t_r			11	22	ns
Turn-Off Delay Time	$t_{d(off)}$			18	36	ns
Turn-Off Fall Time	t_f			19	38	ns
Total Gate Charge	Q_g	V_{DS} = 20V, I_D = 6A, V_{GS} = 4.5V		10	13.3	nC
Gate-Source Charge	Q_{gs}			3.7		nC
Gate-Drain Charge	Q_{gd}			4.2		nC
Drain-Source Diode Characteristics and Maximun Ratings						
Drain-Source Diode Forward Current [b]	I_S				8	A
Drain-Source Diode Forward Voltage [c]	V_{SD}	V_{GS} = 0V, I_S = 1A			1.2	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.
e.Calculated continuous current based on the maximum allowable junction temperature. Package limitation current=8A.

P-Channel Electrical Characteristics T_A = 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	-40			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = -40V, V_{GS} = 0V			-1	μA
Gate Body Leakage Current, Forward	I_{GSSF}	V_{GS} = 20V, V_{DS} = 0V			100	nA
Gate Body Leakage Current, Reverse	I_{GSSR}	V_{GS} = -20V, V_{DS} = 0V			-100	nA
On Characteristics						
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 = -8A		60	72	mΩ
		V_{GS} = -4.5V, I_D = -6A		90	110	mΩ
Dynamic Characteristics [d]						
Forward Transconductance [c]	g_{FS} [c]	V_{DS} = -5V, I_D = -8A		10		S
Input Capacitance	C_{iss}	V_{DS} = -20V, V_{GS} = 0V, f = 1.0 MHz		710		pF
Output Capacitance	C_{oss}			130		pF
Reverse Transfer Capacitance	C_{rss}			80		pF
Switching Characteristics [d]						
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = -15V, I_D = -1A, V_{GS} = -10V, R_{GEN} = 6Ω		11	22	ns
Turn-On Rise Time	t_r			3	6	ns
Turn-Off Delay Time	$t_{d(off)}$			32	64	ns
Turn-On Fall Time	t_f			5	10	ns
Total Gate Charge	Q_g	V_{DS} = -20V, I_D = -4.5A, V_{GS} = -4.5V		5.8	7.7	nC
Gate-Source Charge	Q_{gs}			1.9		nC
Gate-Drain Charge	Q_{gd}			2.5		nC
Drain-Source Diode Characteristics and Maximun Ratings						
Drain-Source Diode Forward Current [b]	I_S				-8	A
Drain-Source Diode Forward Voltage [c]	V_{SD}	V_{GS} = 0V, I_S = -1A			-1.2	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.
e.Calculated continuous current based on the maximum allowable junction temperature. Package limitation current=8A.

N-CHANNEL

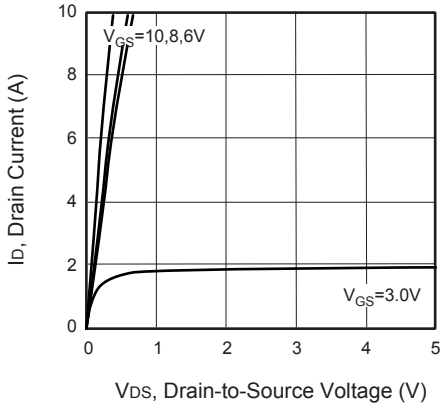


Figure 1. Output Characteristics

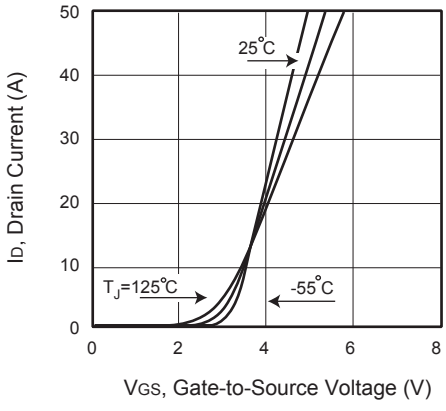


Figure 2. Transfer Characteristics

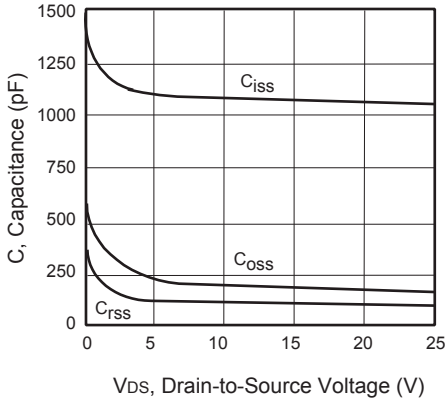


Figure 3. Capacitance

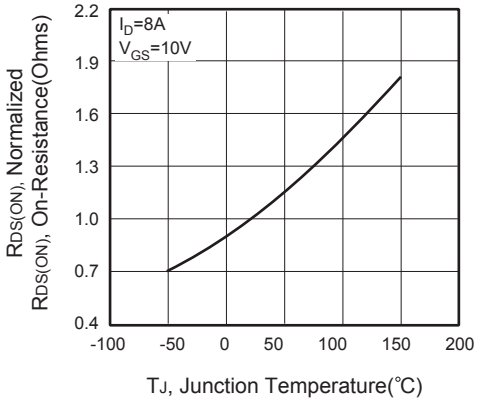


Figure 4. On-Resistance Variation with Temperature

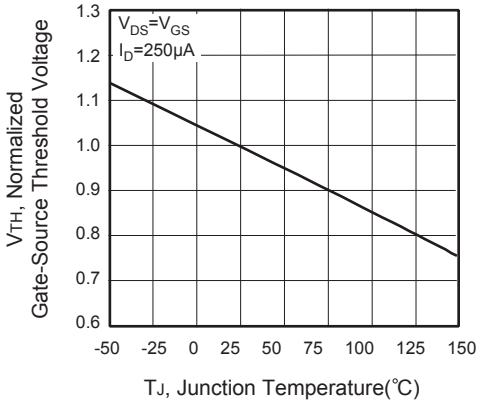


Figure 5. Gate Threshold Variation with Temperature

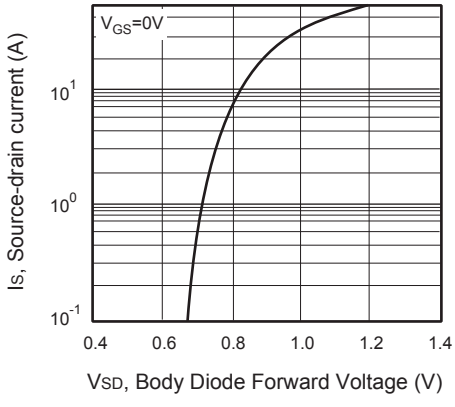


Figure 6. Body Diode Forward Voltage Variation with Source Current

P-CHANNEL

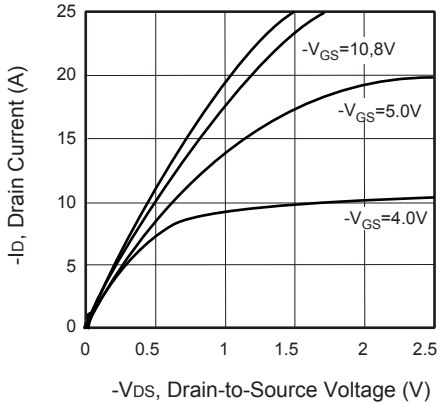


Figure 7. Output Characteristics

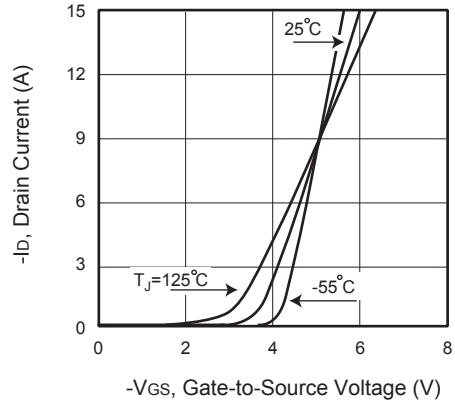


Figure 8. Transfer Characteristics

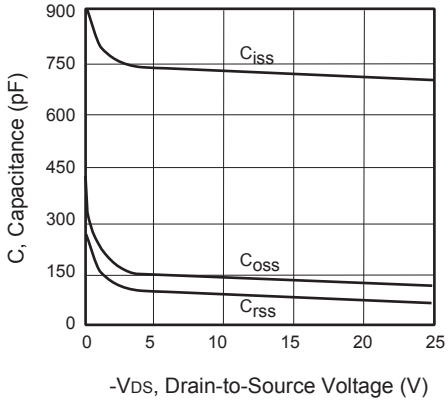


Figure 9. Capacitance

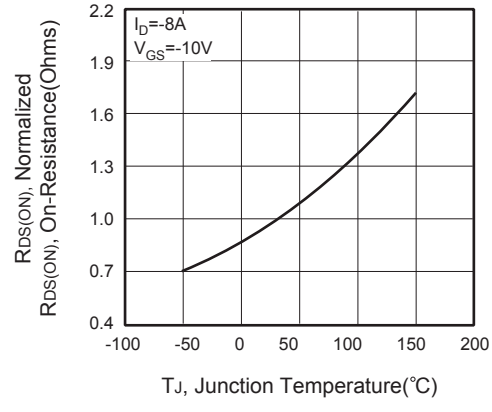


Figure 10. On-Resistance Variation with Temperature

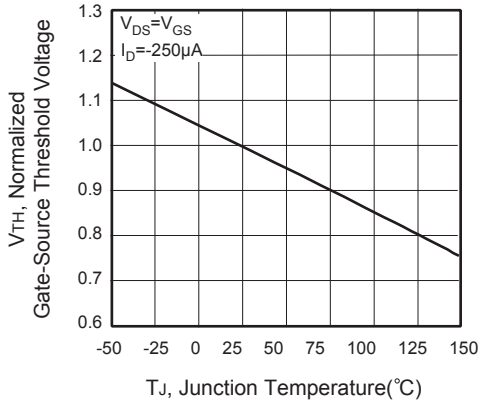


Figure 11. Gate Threshold Variation with Temperature

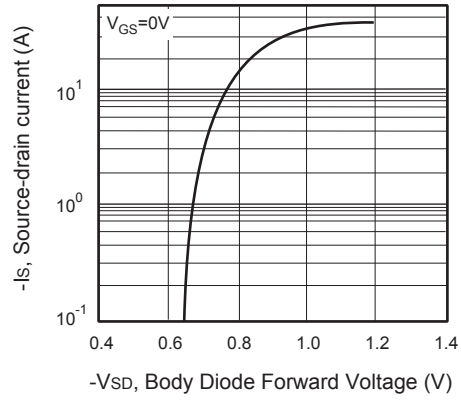


Figure 12. Body Diode Forward Voltage Variation with Source Current

N-CHANNEL

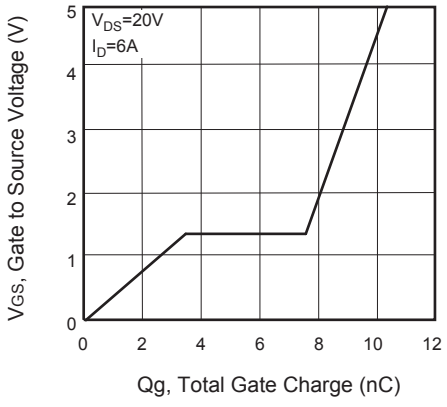


Figure 13. Gate Charge

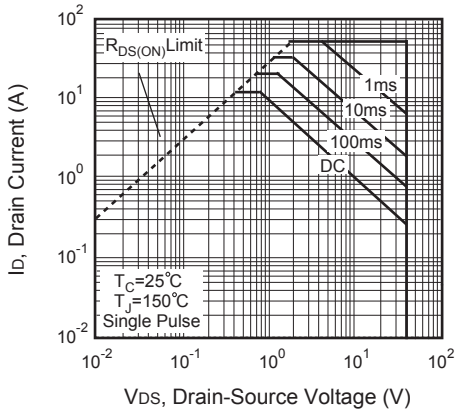


Figure 14. Maximum Safe Operating Area

P-CHANNEL

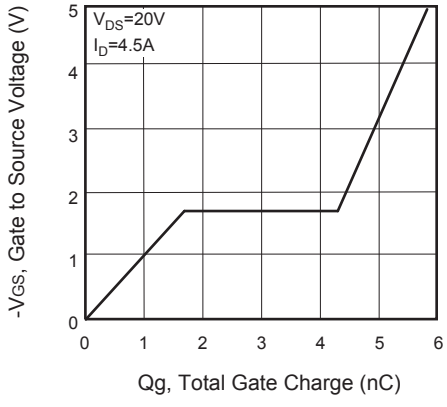


Figure 15. Gate Charge

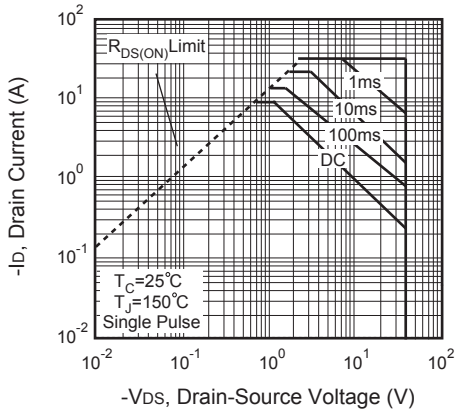


Figure 16. Maximum Safe Operating Area

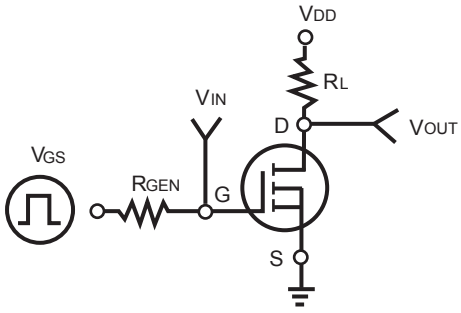


Figure 17. Switching Test Circuit

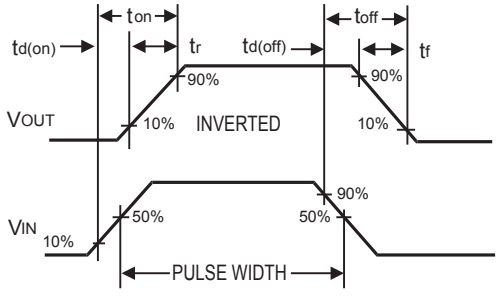


Figure 18. Switching Waveforms

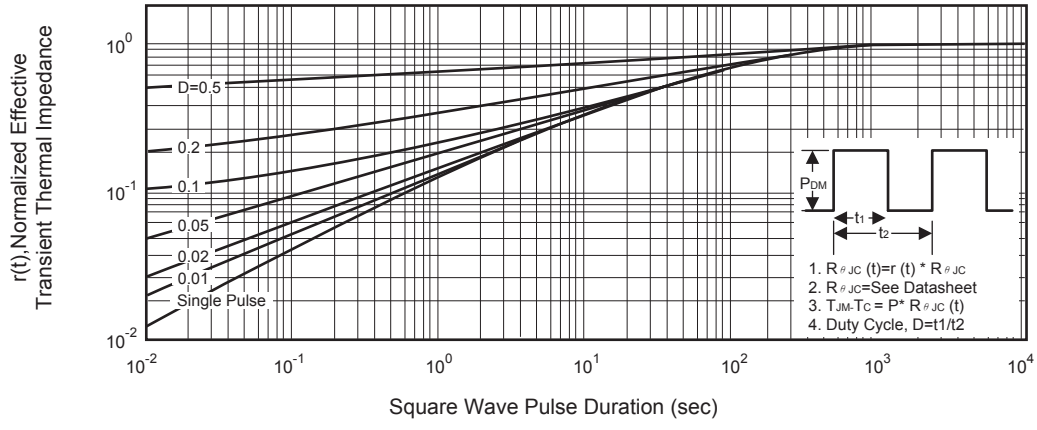


Figure 19. Normalized Thermal Transient Impedance Curve