

N-Channel 40V(D-S) MOSFET

Product summary		
V_{DS}	40	V
$R_{DS(ON)}$ (at $V_{GS}=4.5V$) Typ.	9.7	m Ω
I_D ($T_C=25^\circ C$)	54	A

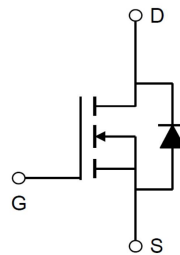
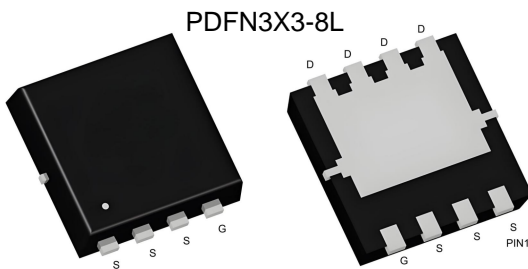
Features

- High density cell design for low $R_{DS(ON)}$
- Trench Power LV MOSFET technology

Applications

- Power management functions
- Load switching

Pin Configuration



Packing Information

Device	Package	Reel Size	Quantity(Min. Package)
ECAL54N04S	PDFN3X3-8L	13"	5000pcs

Absolute Maximum Ratings (at $T_A=25^\circ C$ Unless Otherwise Noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current ^A	$T_C=25^\circ C$	54 A
		$T_C=70^\circ C$	43 A
I_{DM}	Pulse Drain Current Tested @ $T_C=25^\circ C$	160	A
E_{AS}	Single Pulse Avalanche Energy ^B	72.6	mJ
P_D	Power Dissipation @ $T_C=25^\circ C$	41.6	W
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to +150	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Typical	Units
$R_{\theta JC}$	Thermal Resistance-Junction to case max	3	$^\circ C/W$

Electrical Characteristics (at $T_J = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
Static Parameters						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=40V, V_{GS}=0V$	--	--	1	μA
I_{GSS}	Gate-Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	--	--	± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.6	2.5	V
$R_{DS(on)}$	Drain-Source On-State Resistance ^C	$V_{GS}=10V, I_D=15A$	--	7	8.5	m Ω
		$V_{GS}=4.5V, I_D=8A$	--	9.7	13	m Ω
V_{SD}	Diode Forward Voltage	$I_S=15A, V_{GS}=0V$	--	0.8	1.2	V
Dynamic Parameters ^D						
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=20V$ $f=1\text{MHz}$	--	1320	--	pF
C_{oss}	Output Capacitance		--	141	--	pF
C_{rss}	Reverse Transfer Capacitance		--	103	--	pF
Q_g	Total Gate Charge	$V_{DS}=20V, I_D=10A$ $V_{GS}=10V$	--	13.7	--	nC
Q_{gs}	Gate-Source Charge		--	1.1	--	nC
Q_{gd}	Gate-Drain Charge		--	4.8	--	nC
$t_{D(on)}$	Turn-on Delay Time	$V_{DS}=20V$ $I_D=1A, R_G=3.3\Omega,$ $V_{GS}=10V$	--	8.1	--	ns
t_r	Turn-on Rise Time		--	15	--	ns
$t_{D(off)}$	Turn-off Delay Time		--	32	--	ns
t_f	Turn-off Fall Time		--	12	--	ns

A. Rated according to $R_{\theta JC}$, Package limited.

B. The EAS data shows Max. rating . The test condition is $V_{GS}=10V, R_G=25\Omega, L=0.3\text{mH}, I_{AS}=22A, T_A=25^\circ\text{C}$.

C. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

D. Guaranteed by design, not subject to production testing.

Typical Characteristics

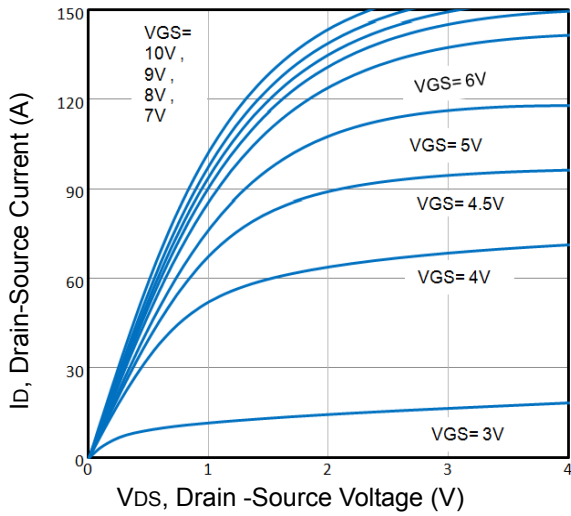


Fig1. Typical Output Characteristics

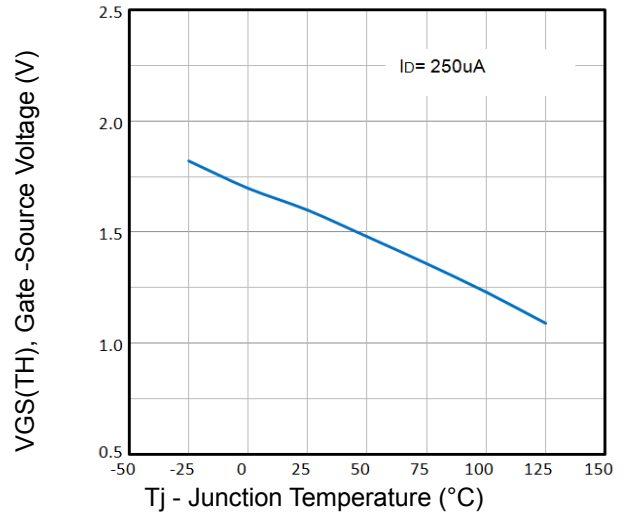


Fig2. VGS(TH) Voltage Vs. Temperature

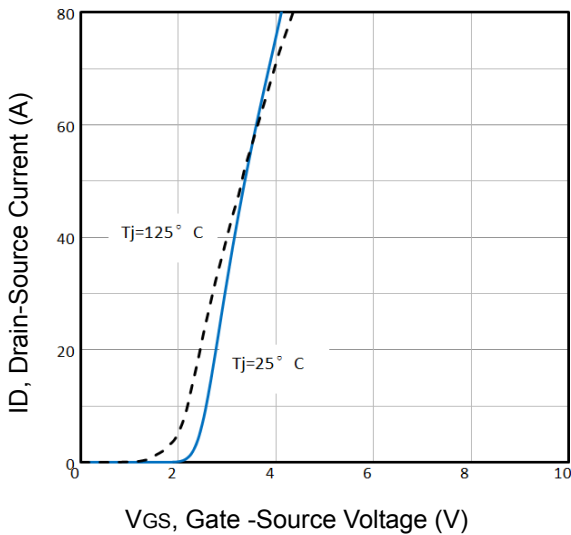


Fig3. Typical Transfer Characteristics

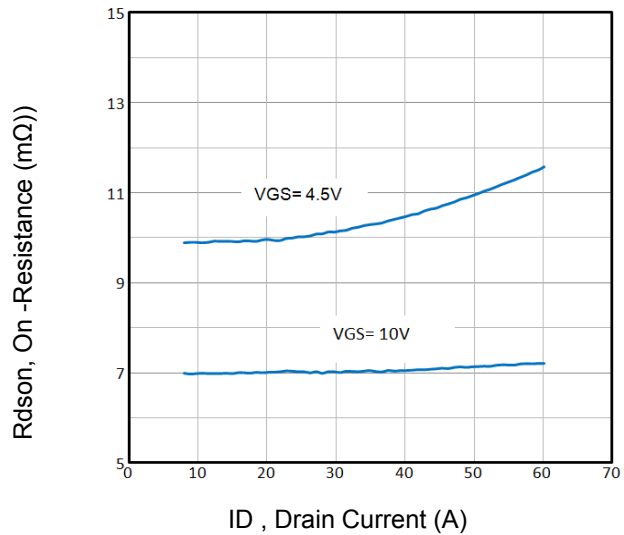


Fig4. On-Resistance vs. Drain Current and Gate Voltage

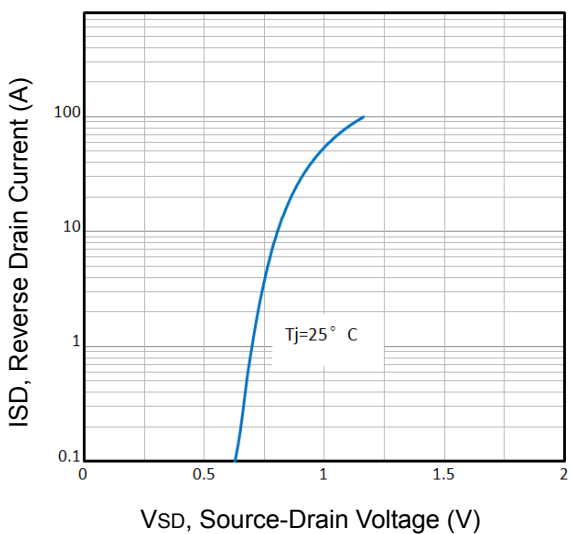


Fig5. Typical Source-Drain Diode Forward Voltage

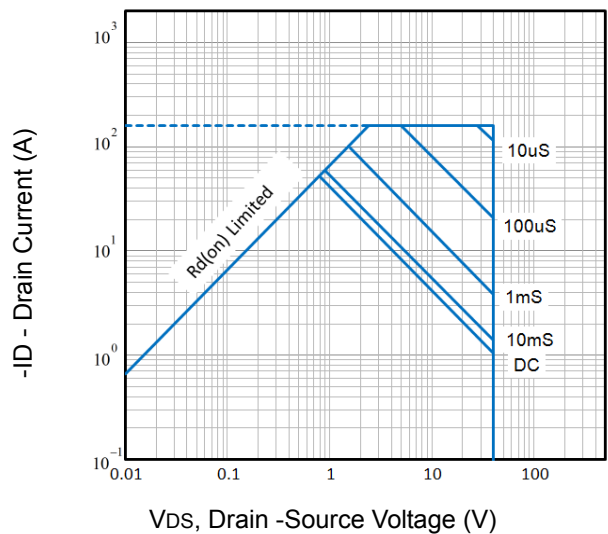


Fig6. Maximum Safe Operating Area

Typical Characteristics

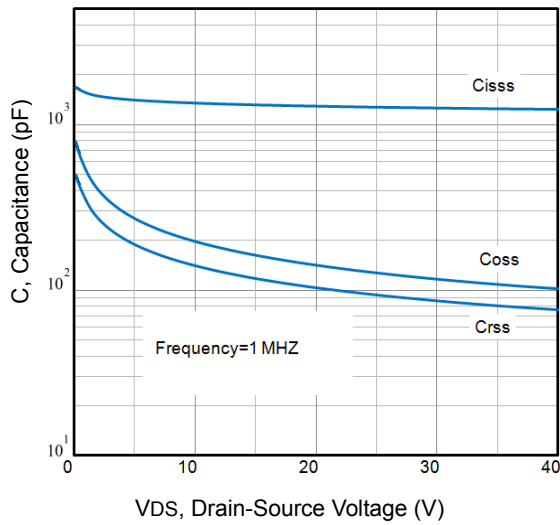


Fig7. Typical Capacitance Vs. Drain-Source Voltage

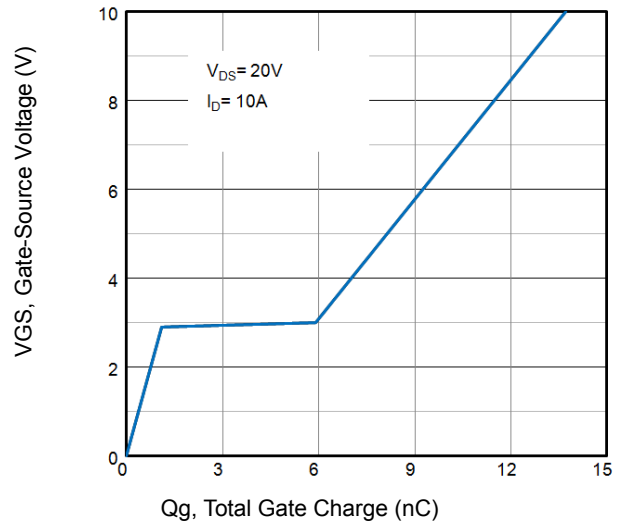


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

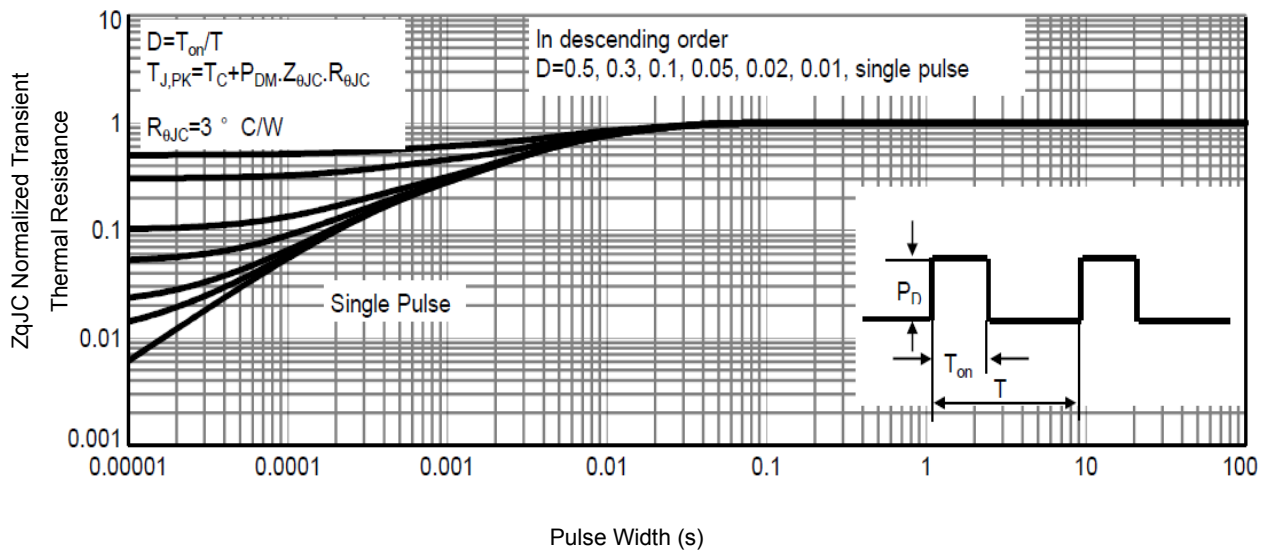


Fig9. Normalized Maximum Transient Thermal Impedance

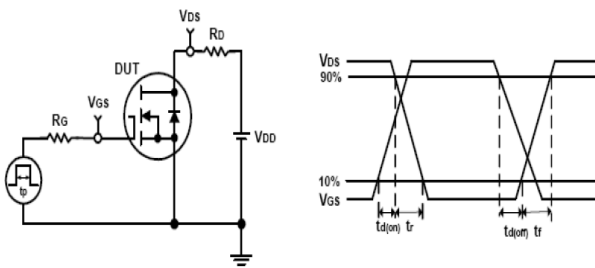


Fig10. Switching Time Test Circuit and waveforms

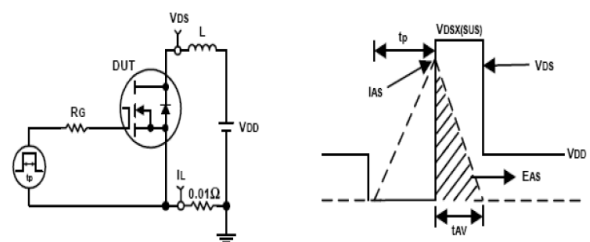
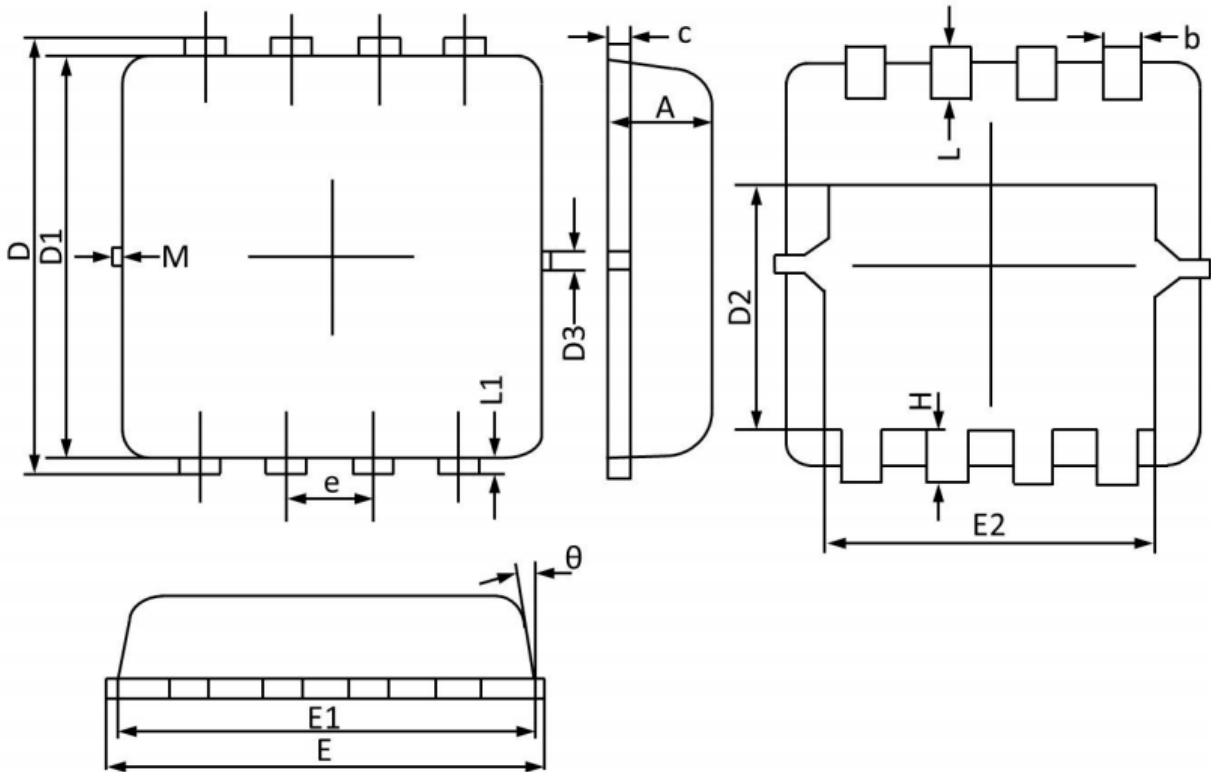


Fig11. Unclamped Inductive Test Circuit and waveforms

PDFN3X3-8L Package Information



DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.70	0.75	0.80	b	0.25	0.30	0.35
C	0.10	0.15	0.25	D	3.25	3.35	3.45
D1	3.00	3.10	3.20	D2	1.78	1.88	1.98
D3	--	0.13	--	E	3.20	3.30	3.40
E1	3.00	3.15	3.20	E2	2.39	2.49	2.59
e	0.65BSC			H	0.30	0.39	0.50
L	0.30	0.40	0.50	L1	--	0.13	--
θ	--	10°	12°	M	*	*	0.15