

N-Channel 40V(D-S) MOSFET

Product summary

V_{DS}	40	V
$R_{DS(ON)}$ (at $V_{GS}=10V$) Typ.	11	m Ω
$R_{DS(ON)}$ (at $V_{GS}=4.5V$) Typ.	14	m Ω
I_D ($T_c=25^{\circ}C$)	20	A

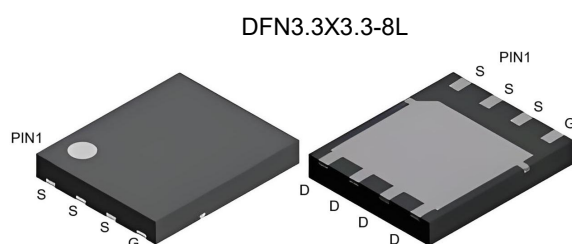
Features

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

Applications

- Load switching
- High current load applications
- Uninterruptible power supply

Pin Configuration



Packing Information

Device	Package	Reel Size	Quantity(Min. Package)
ECAL20N04A	DFN3.3X3.3-8L	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	$T_C=25^{\circ}C$	20
		$T_C=100^{\circ}C$	14
I_{DM}	Pulse Drain Current Tested ^A	90	A
E_{AS}	Single Pulse Avalanche Energy ^B	70	mJ
P_D	Power Dissipation	21	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	5.9	$^{\circ}C/W$

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	1.5	2.5	V
$R_{DS(on)}$	Drain-Source On-State Resistance ^A	$V_{GS}=10V, I_D=20A$	--	11	14	m Ω
		$V_{GS}=4.5V, I_D=10A$	--	14	19	m Ω
V_{SD}	Diode Forward Voltage	$I_S=10A, V_{GS}=0V$	--	--	1.2	V
I_S	Maximum Body-Diode Continuous Current		--	--	20	A
Dynamic Parameters ^C						
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=20V$ $f=1\text{MHz}$	--	917	--	pF
C_{oss}	Output Capacitance		--	128	--	pF
C_{rss}	Reverse Transfer Capacitance		--	108	--	pF
Q_g	Total Gate Charge	$V_{DS}=20V, I_D=20A$ $V_{GS}=10V$	--	23.6	--	nC
Q_{gs}	Gate-Source Charge		--	4.4	--	nC
Q_{gd}	Gate-Drain Charge		--	6.3	--	nC
$t_{D(on)}$	Turn-on Delay Time	$V_{DD}=20V$ $I_D=2A,$ $V_{GS}=10V, R_{GEN}=3\Omega$	--	10	--	ns
t_r	Turn-on Rise Time		--	56	--	ns
$t_{D(off)}$	Turn-off Delay Time		--	27	--	ns
t_f	Turn-off Fall Time		--	72	--	ns

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

B. The EAS data shows Max. rating . The test condition is $V_{DD}=20V, V_{GS}=10V, L=0.5\text{mH}, R_g=25\Omega$.

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

Typical Characteristics

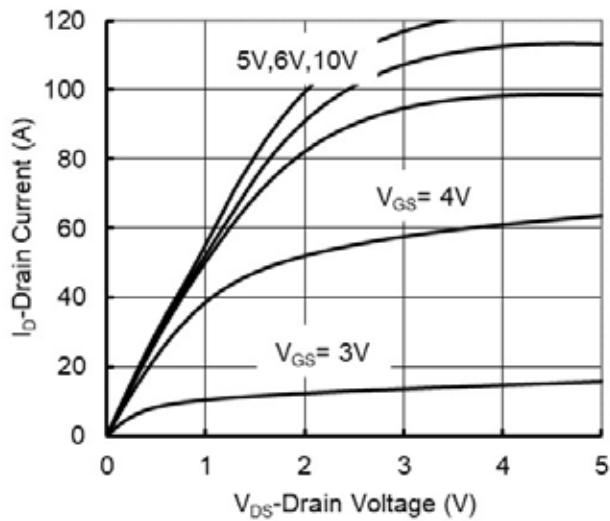


Figure 1. Output Characteristics

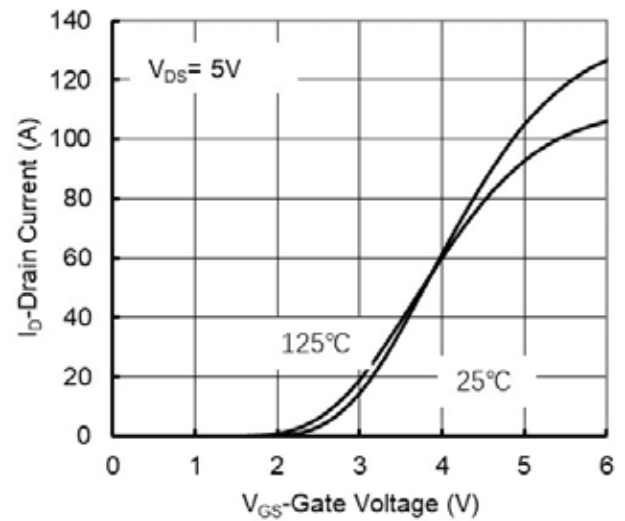


Figure 2. Transfer Characteristics

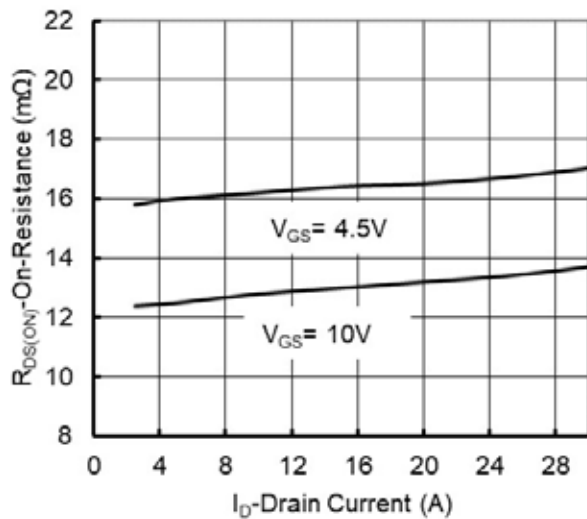


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

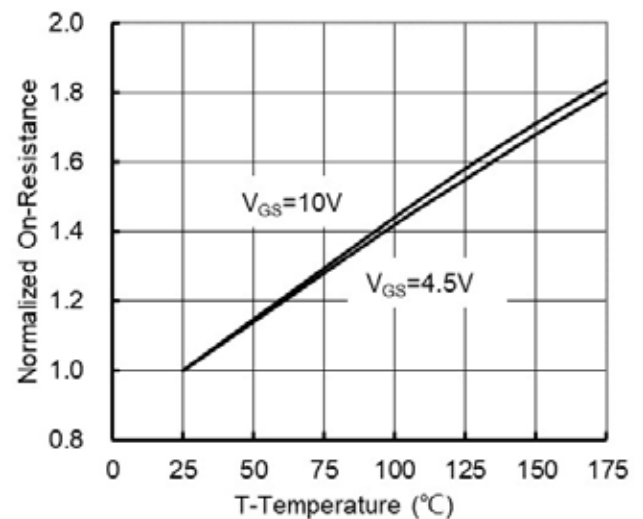


Figure 4. On-Resistance vs. Junction Temperature

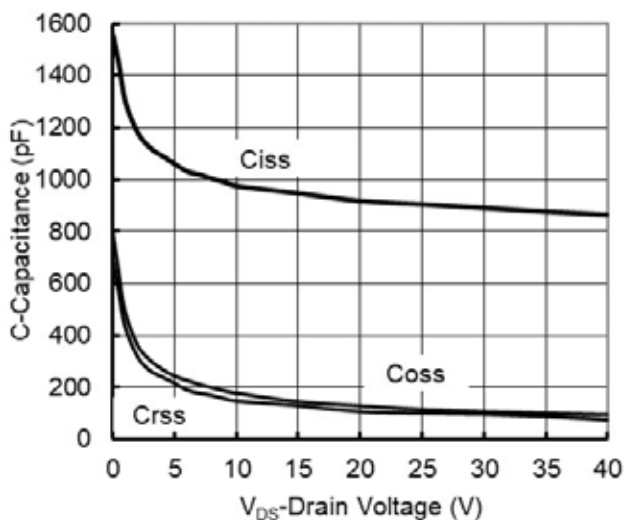


Figure 5. Capacitance Characteristics

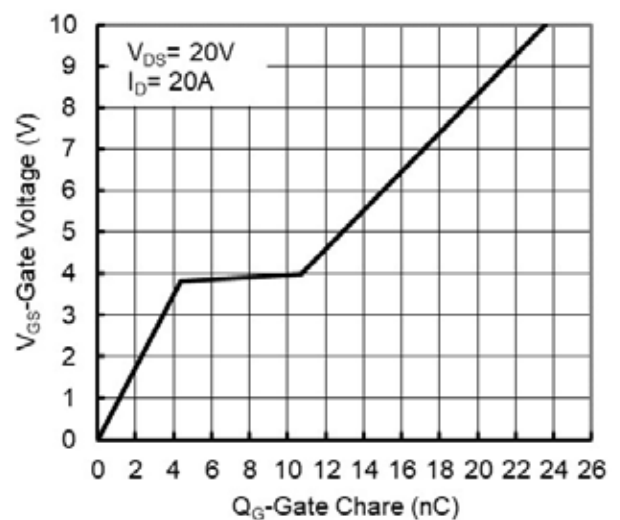


Figure 6. Gate Charge

Typical Characteristics

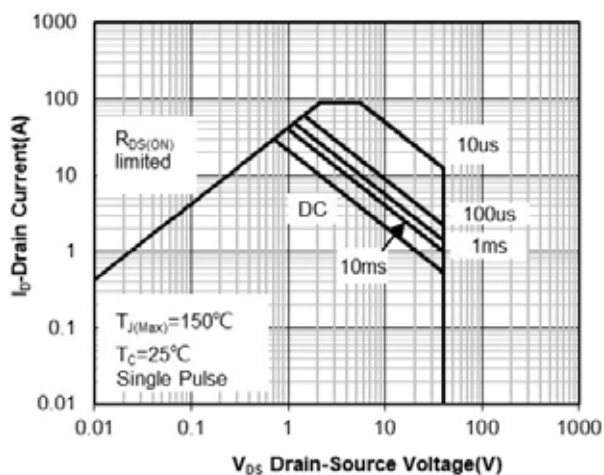


Figure 7. Safe Operation Area

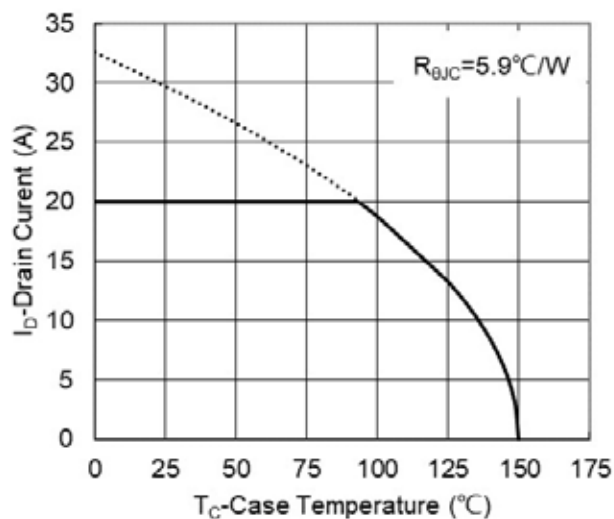


Figure 8. Maximum Continuous Drain Current vs Case Temperature

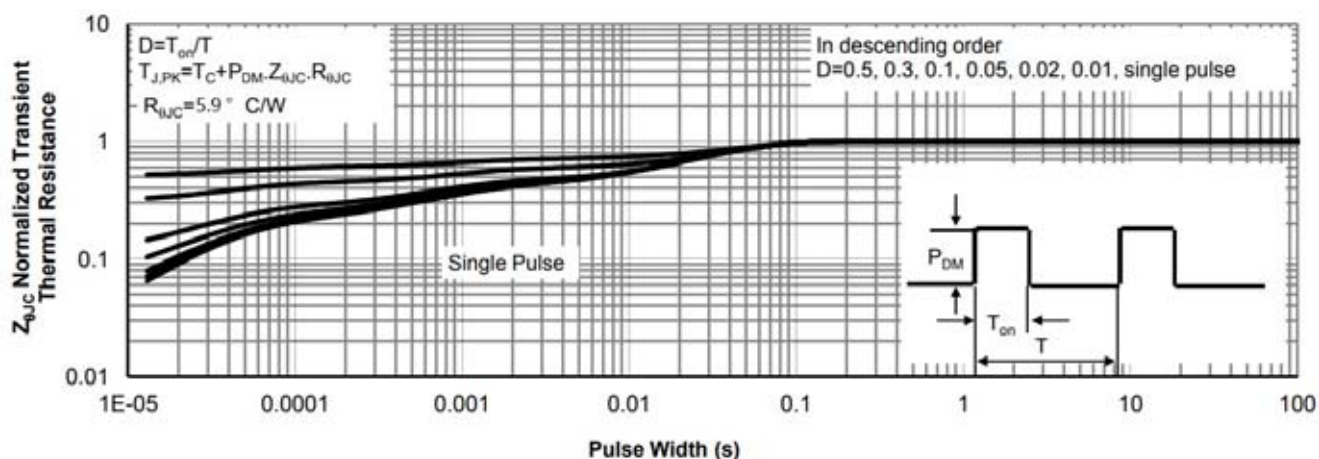
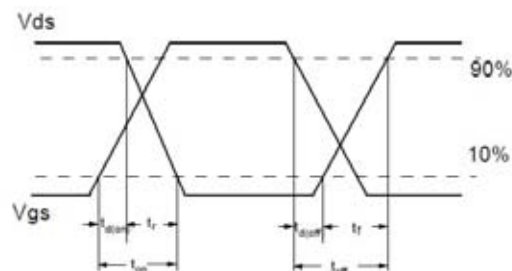
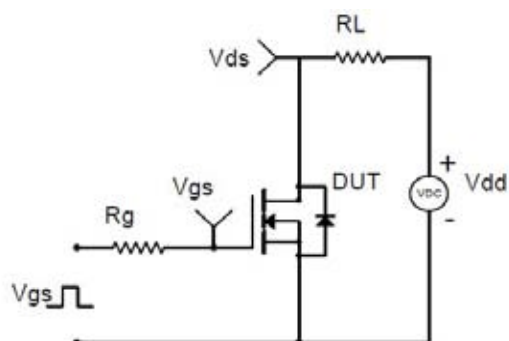
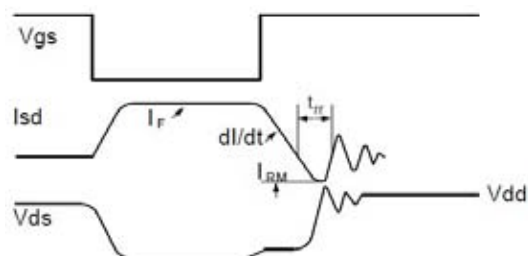
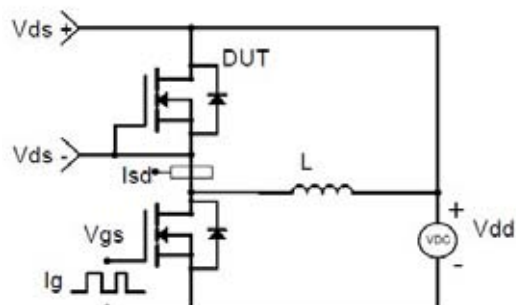


Figure 9. Normalized Maximum Transient Thermal Impedance

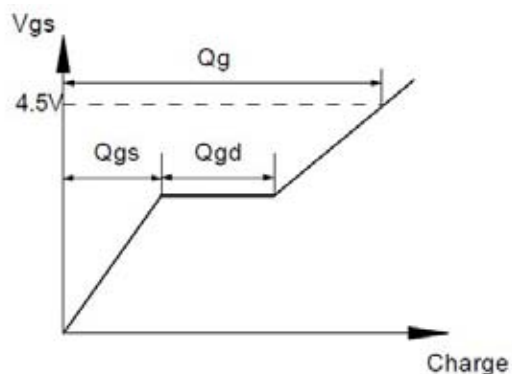
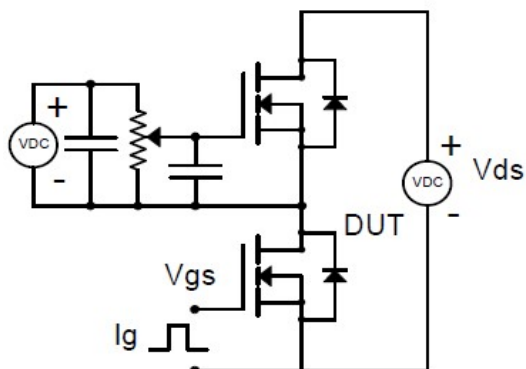
Typical Characteristics



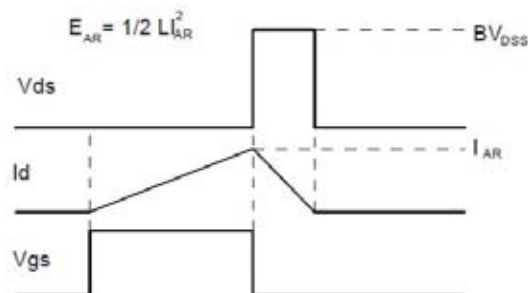
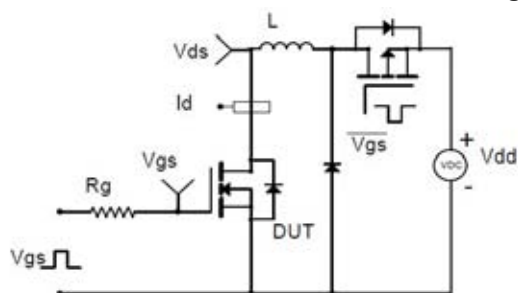
Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Gate Charge Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

A	B	C	C1
3.25±0.05	3.25±0.05	0.8±0.05	0.2±0.02
C2	D	E	F
0.05Max	1.9±0.1	2.35±0.15	0.45±0.05
G	H	e	
0.3±0.05	0.35±0.05	0.65±0.05	
单位: mm			