

## P-Channel 30V(D-S) MOSFET

Product summary		
$V_{DS}$	-30	V
$R_{DS(ON)}$ (at $V_{GS}=-10V$ ) Typ.	11	m $\Omega$
$R_{DS(ON)}$ (at $V_{GS}=-4.5V$ ) Typ.	17	m $\Omega$
$I_D$ ( $T_C=25^\circ C$ )	-20	A

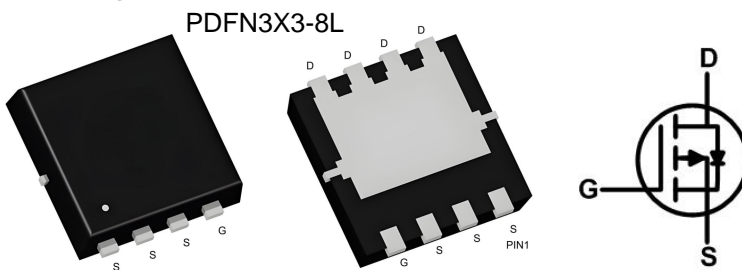
### Features

- Advanced Trench technology
- Low Gate Charge

### Applications

- Load switching
- PWM Applications
- Power Management

### Pin Configuration



### Packing Information

Device	Package	Reel Size	Quantity(Min. Package)
ECAL20P03A	PDFN3X3-8L	13"	3000pcs

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

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current	$T_C=25^\circ C$	-20 A
		$T_C=100^\circ C$	-13 A
$I_{DM}$	Pulse Drain Current Tested <sup>A</sup>	-60	A
$E_{AS}$	Single Pulse Avalanche Energy <sup>B</sup>	40	mJ
$P_D$	Power Dissipation $T_C=25^\circ C$	5.4	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	23	$^\circ C/W$

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

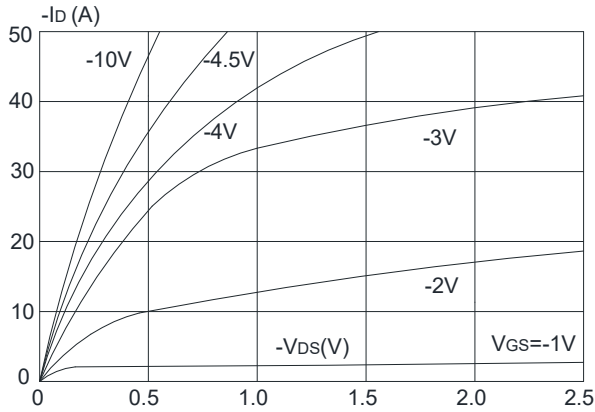
Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
<b>Static Parameters</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-30	--	--	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-30V, V_{GS}=0V$	--	--	-1	$\mu A$
$I_{GSS}$	Gate-Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	--	--	$\pm 100$	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 <sup>C</sup>	$V_{GS}=-10V, I_D=-10A$	--	11	14	m $\Omega$
		$V_{GS}=-4.5V, I_D=-5A$	--	17	24	m $\Omega$
$V_{SD}$	Diode Forward Voltage	$I_S=-15A, V_{GS}=0V$	--	--	-1.2	V
$I_S$	Continuous Source Current	$V_G=V_D=0V$ , Force Current	--	--	-15	A
<b>Dynamic Parameters <sup>D</sup></b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=-15V$ $f=1\text{MHz}$	--	2070	--	pF
$C_{oss}$	Output Capacitance		--	273	--	pF
$C_{rss}$	Reverse Transfer Capacitance		--	246	--	pF
$Q_g$	Total Gate Charge	$V_{DS}=-15V, I_D=-5A$ $V_{GS}=-10V$	--	22	--	nC
$Q_{gs}$	Gate-Source Charge		--	4	--	nC
$Q_{gd}$	Gate-Drain Charge		--	5.8	--	nC
$t_{D(on)}$	Turn-on Delay Time	$V_{DD}=-15V$ $I_D=-10A, V_{GS}=-10V$ , $R_{GEN}=2.5\Omega$	--	9	--	ns
$t_r$	Turn-on Rise Time		--	13	--	ns
$t_{D(off)}$	Turn-off Delay Time		--	48	--	ns
$t_f$	Turn-off Fall Time		--	20	--	ns
$t_{rr}$	Reverse recovery time	$I_F=-2.8A$ , $di/dt=100\text{ A/uS}$	--	64	--	ns
$Q_{rr}$	Reverse recovery charge		--	25	--	nC

Note:

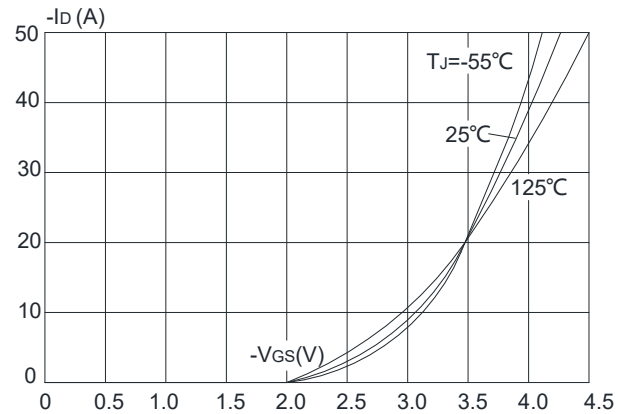
- A. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
- B. The EAS data shows Max. rating . The test condition is  $V_{GS}=-10V, L=0.5\text{mH}, I_{AS}=-12.7A, R_g=25\Omega, T_J=25^\circ\text{C}$ .
- C. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$ .
- D. Guaranteed by design, not subject to production testing.

Typical Characteristics

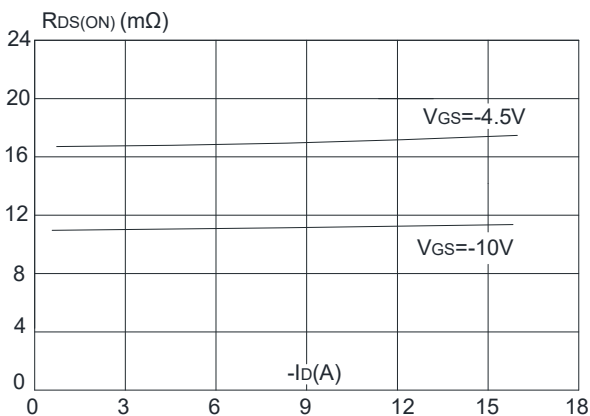
**Figure 1: Output Characteristics**



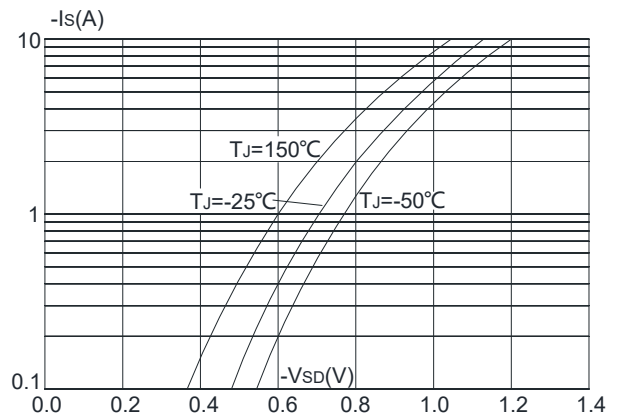
**Figure 2: Typical Transfer Characteristics**



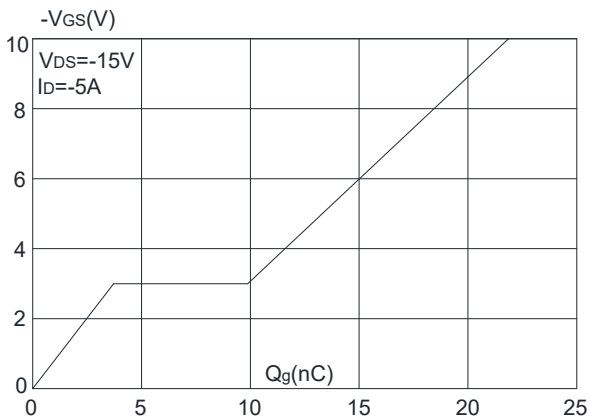
**Figure 3: On-resistance vs. Drain Current**



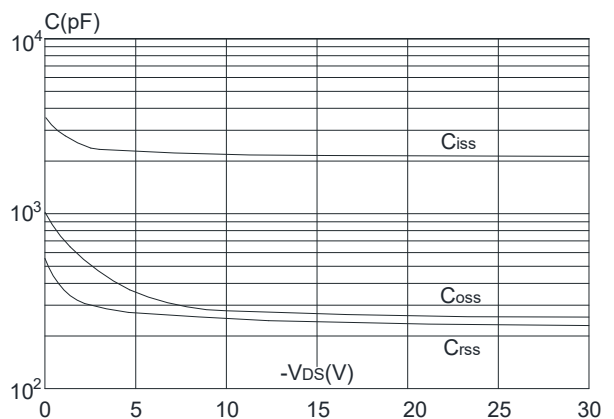
**Figure 4: Body Diode Characteristics**



**Figure 5: Gate Charge Characteristics**

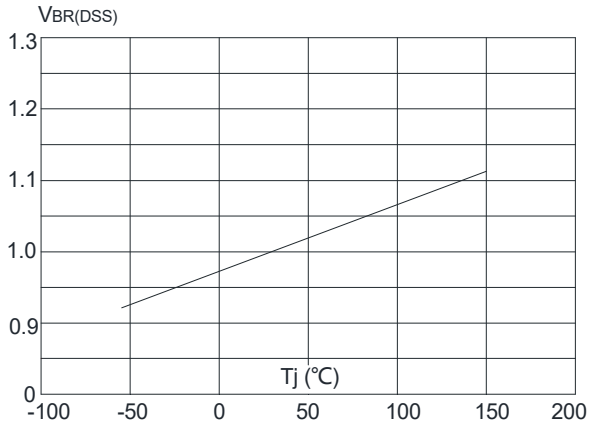


**Figure 6: Capacitance Characteristics**

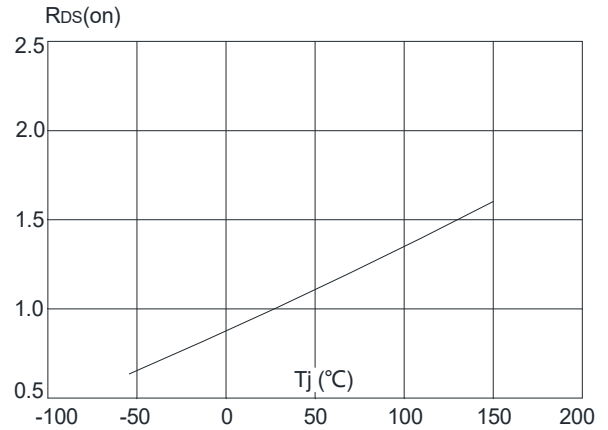


Typical Characteristics

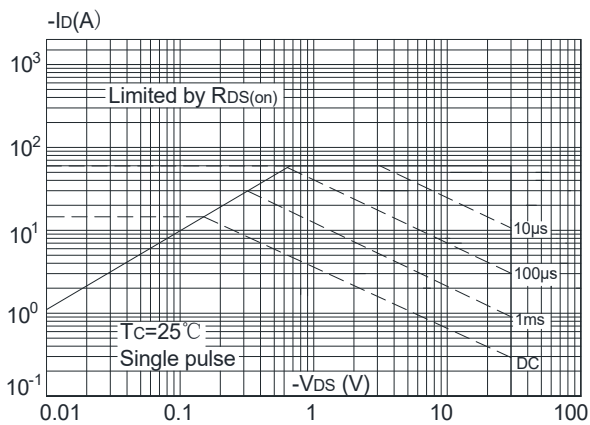
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



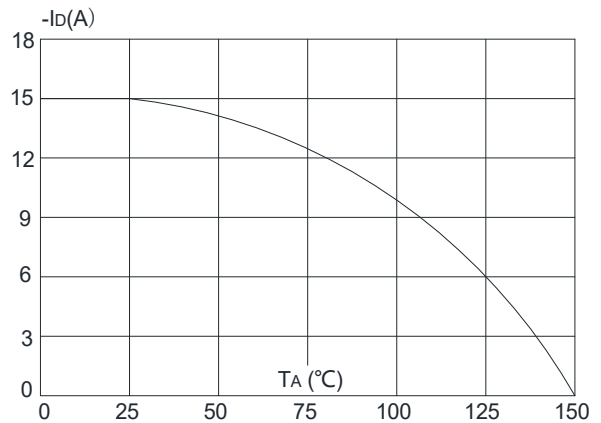
**Figure 8:** Normalized on Resistance vs. Junction Temperature



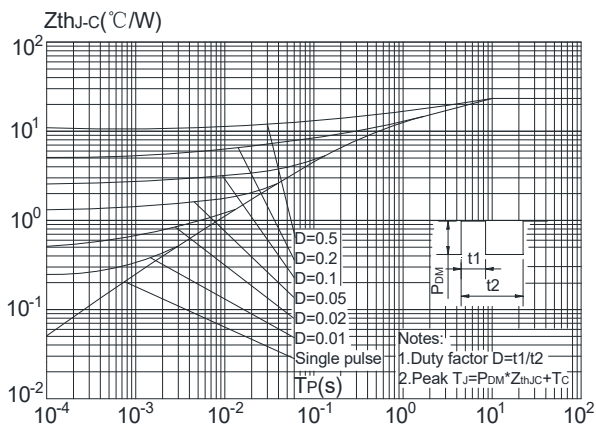
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature

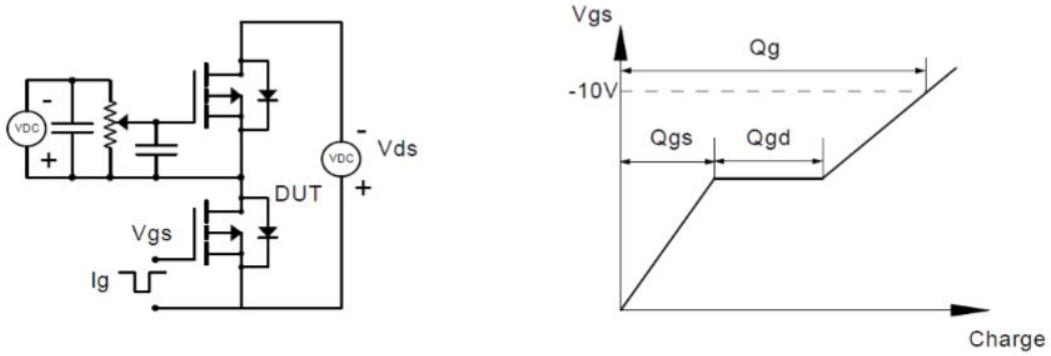


**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case

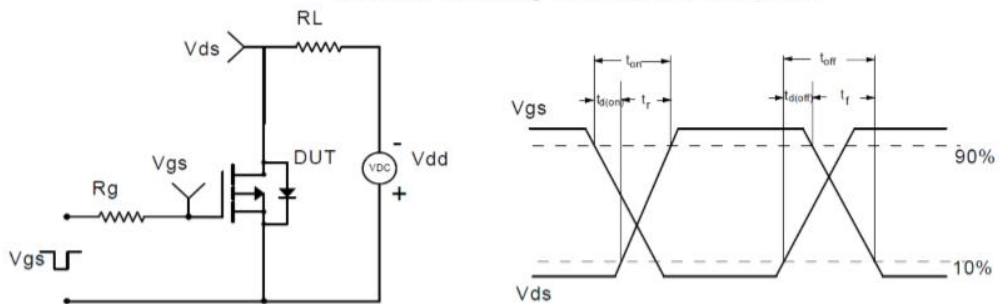


Test Circuit

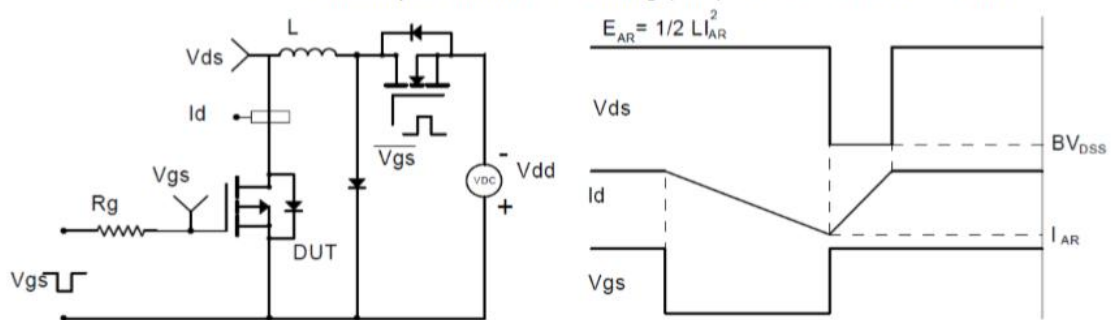
Gate Charge Test Circuit & Waveform



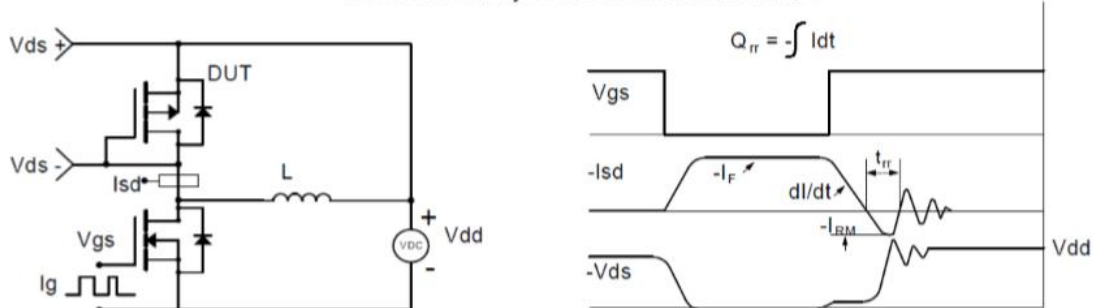
Resistive Switching Test Circuit & Waveforms



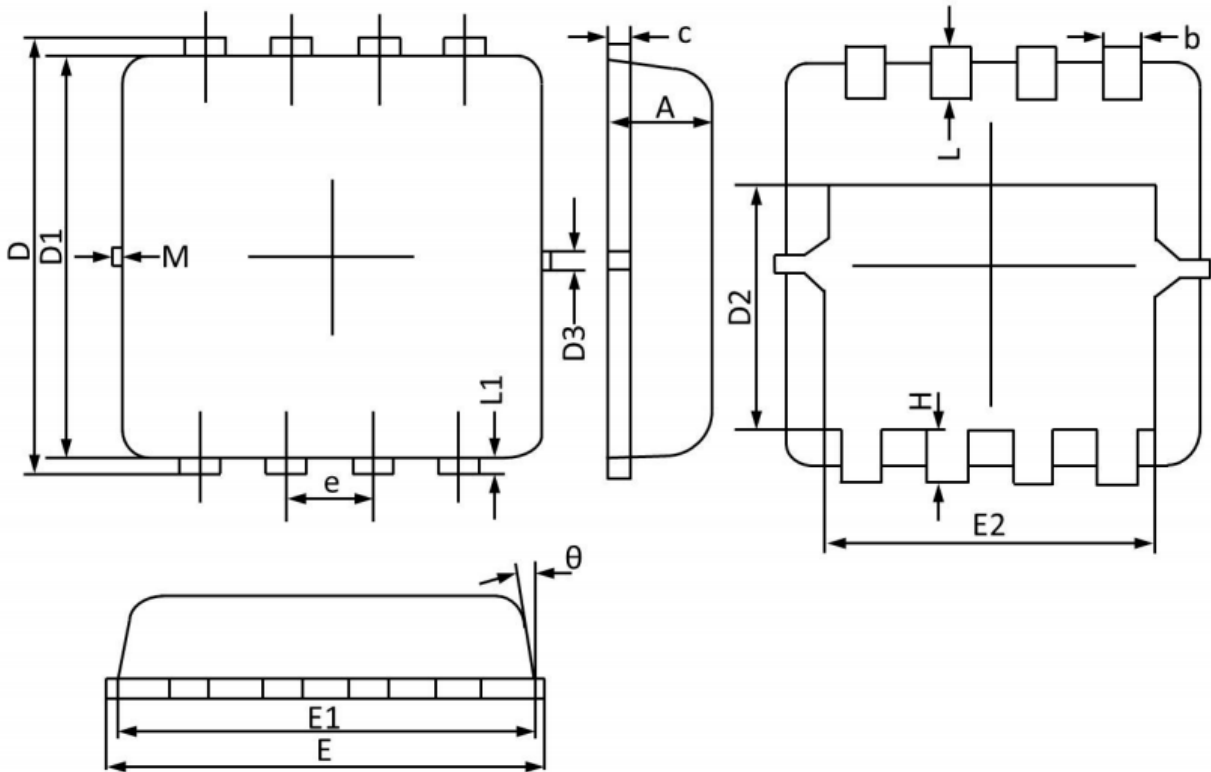
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



## PDFN3X3-8L Package Information (unit:mm)



## DIMENSIONS

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	--
theta	--	10°	12°	M	*	*	0.15