

P-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.	15	m Ω
I_D ($T_C=25^\circ C$)	-52	A

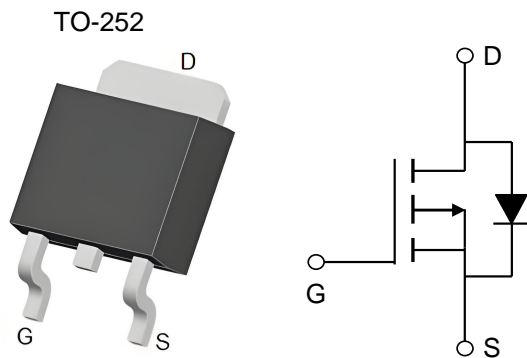
Features

- High density cell design for low $R_{ds(on)}$
- Trench Power LV MOSFET technology
- RoHS Compliant

Applications

- Load Switch
- Power Management

Pin Configuration



Packing Information

Device	Package	Reel Size	Quantity(Min. Package)
ECG40P50C	TO-252	13"	2500pcs

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 at $V_{GS}=10V$	$T_C=25^\circ C$	-52	A
		$T_C=70^\circ C$	-32	A
I_{DM}	Pulse Drain Current Tested	-105	A	
P_D	Power Dissipation	$T_C=25^\circ C$	52	W
E_{AS}	Single Pulse Avalanche Energy	146	mJ	
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to 150	$^\circ C$	

Thermal Characteristics

Symbol	Parameter	Typical	Units
$R_{\theta JA}$	Thermal Resistance-Junction to ambient	62	$^\circ C/W$

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	$V_{DS}=-32V, V_{GS}=0V$	--	--	-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	$V_{GS}=-10V, I_D=-18A$	--	11	13	$m\Omega$
		$V_{GS}=-4.5V, I_D=-12A$	--	15	20	$m\Omega$
V_{SD}	Forward Voltage	$I_{SD}=-1A, V_{GS}=0V$	--	--	-1	V
Dynamic Parameters						
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=-15V$ $f=1\text{MHz}$	--	3468	--	pF
C_{oss}	Output Capacitance		--	317	--	pF
C_{rss}	Reverse Transfer Capacitance		--	235	--	pF
Q_g	Total Gate Charge	$V_{DS}=-20V, I_D=-12A$ $V_{GS}=-4.5V$	--	28.6	--	nC
Q_{gs}	Gate-Source Charge		--	7.9	--	nC
Q_{gd}	Gate-Drain Charge		--	7.6	--	nC
Switching Parameters						
$t_{D(on)}$	Turn-on Delay Time	$V_{DS}=-15V, I_D=-1A$ $R_G=3.3\Omega,$ $V_{GS}=-10V$	--	40.5	--	nS
t_r	Turn-on Rise Time		--	35.6	--	nS
$t_{D(off)}$	Turn-off Delay Time		--	99.7	--	nS
t_f	Turn-off Fall Time		--	9.6	--	nS

Typical Characteristics

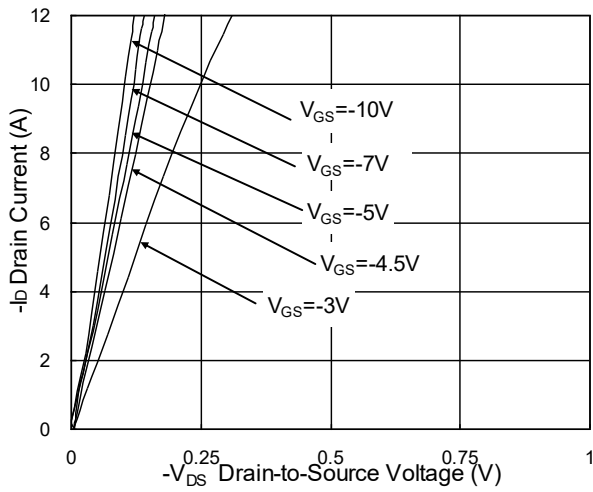


Fig.1 Typical Output Characteristics

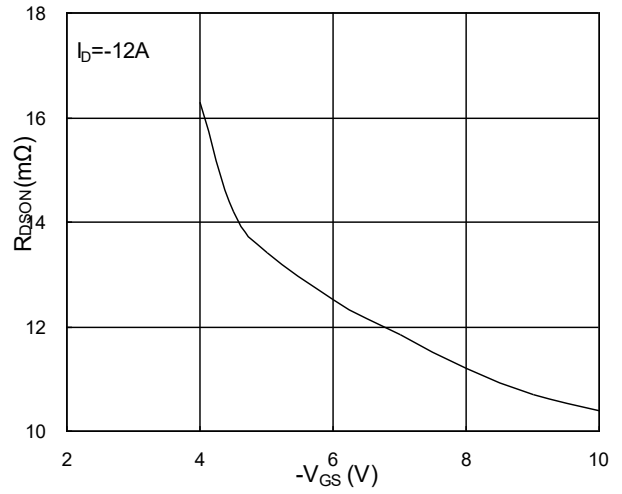


Fig.2 On-Resistance v.s Gate-Source

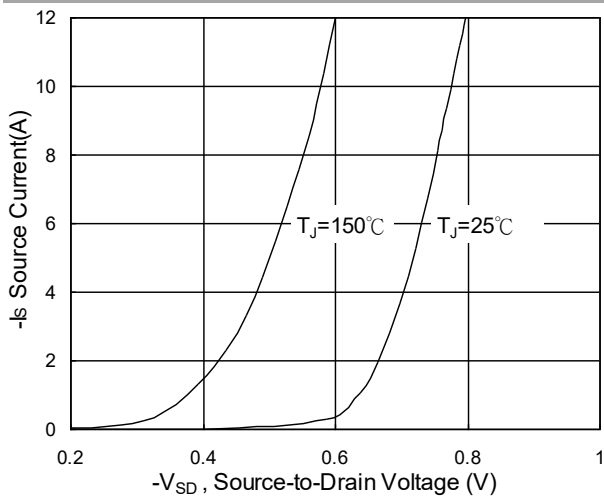


Fig.3 Forward Characteristics Of Reverse

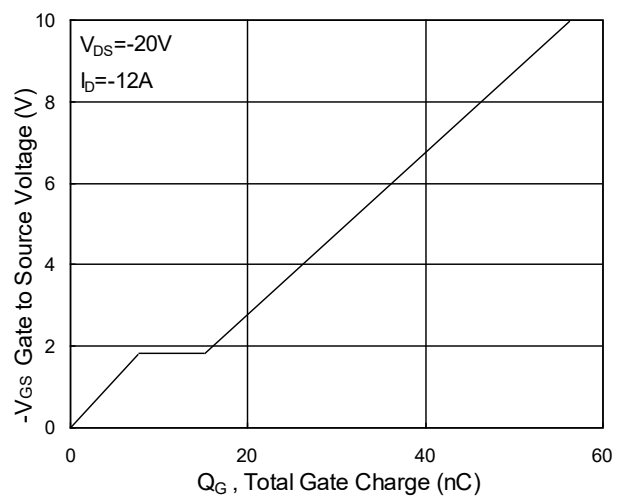


Fig.4 Gate-Charge Characteristics

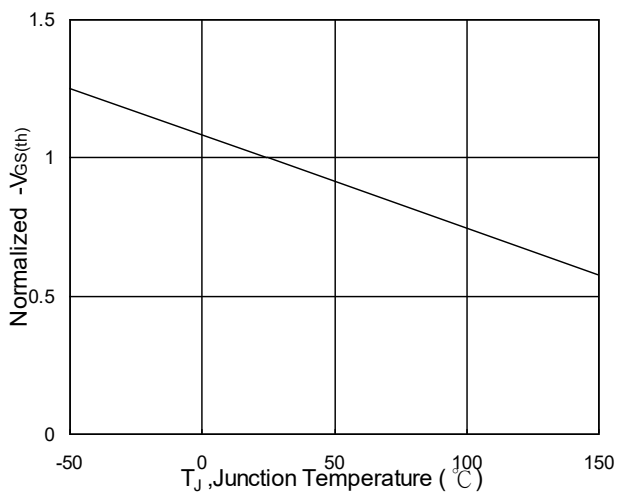


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

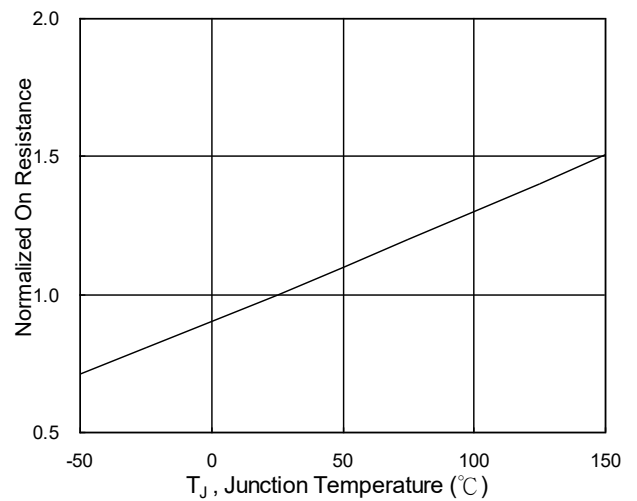


Fig.6 Normalized $R_{DS(on)}$ v.s T_J

Typical Characteristics

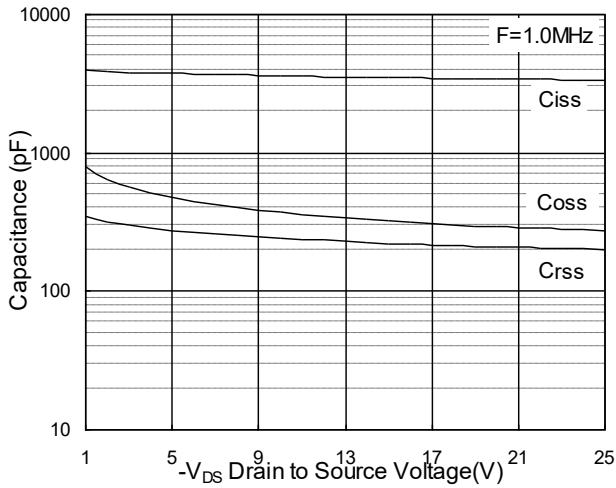


Fig.7 Capacitance

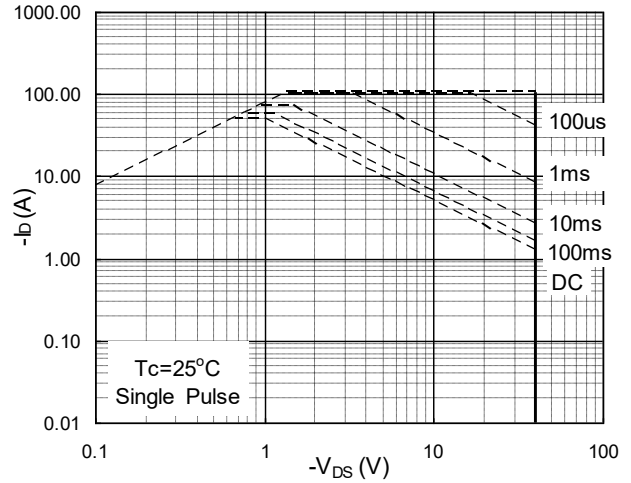


Fig.8 Safe Operating Area

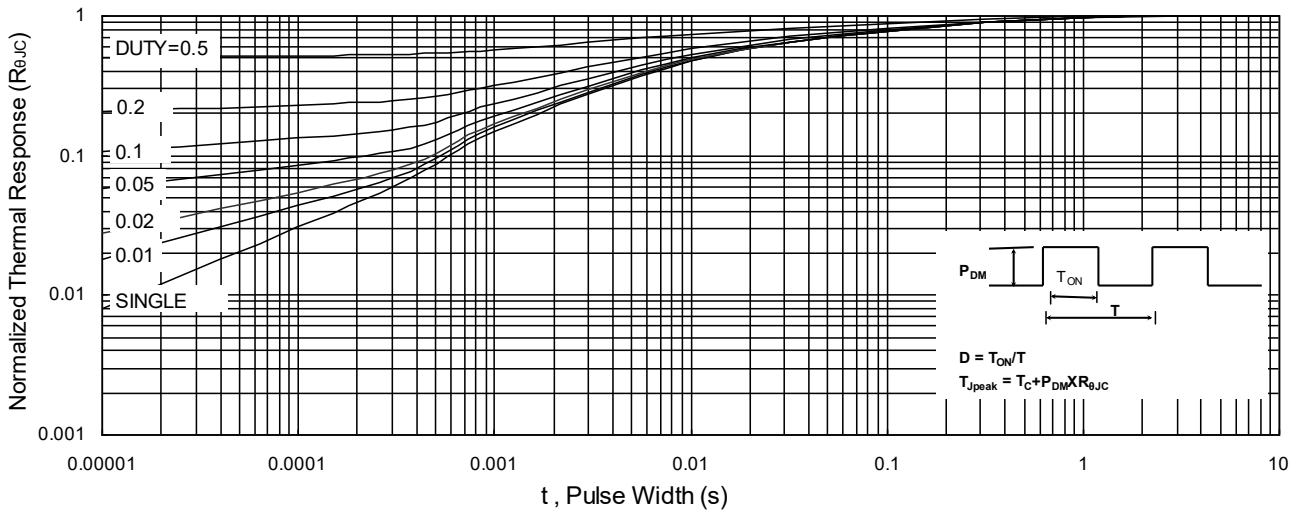


Fig.9 Normalized Maximum Transient Thermal Impedance

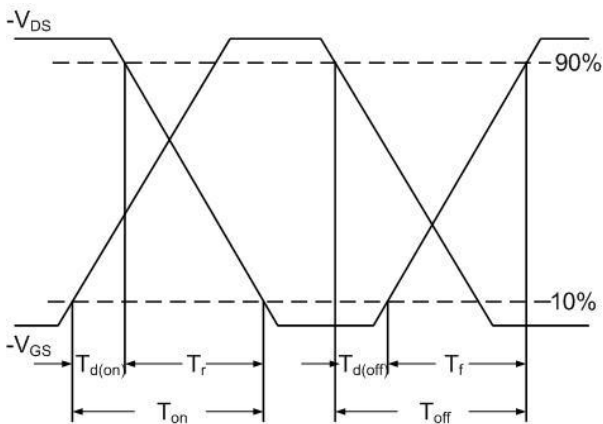


Fig.10 Switching Time Waveform

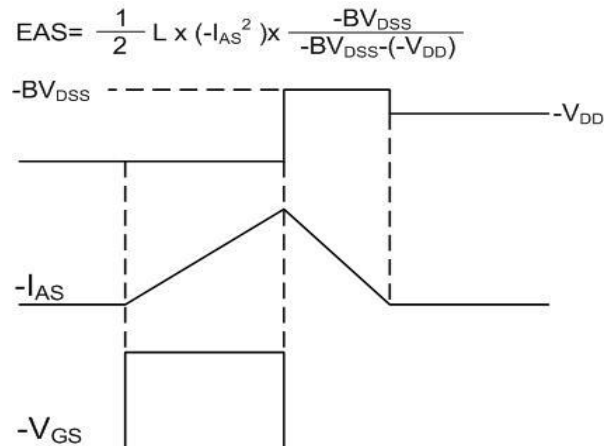
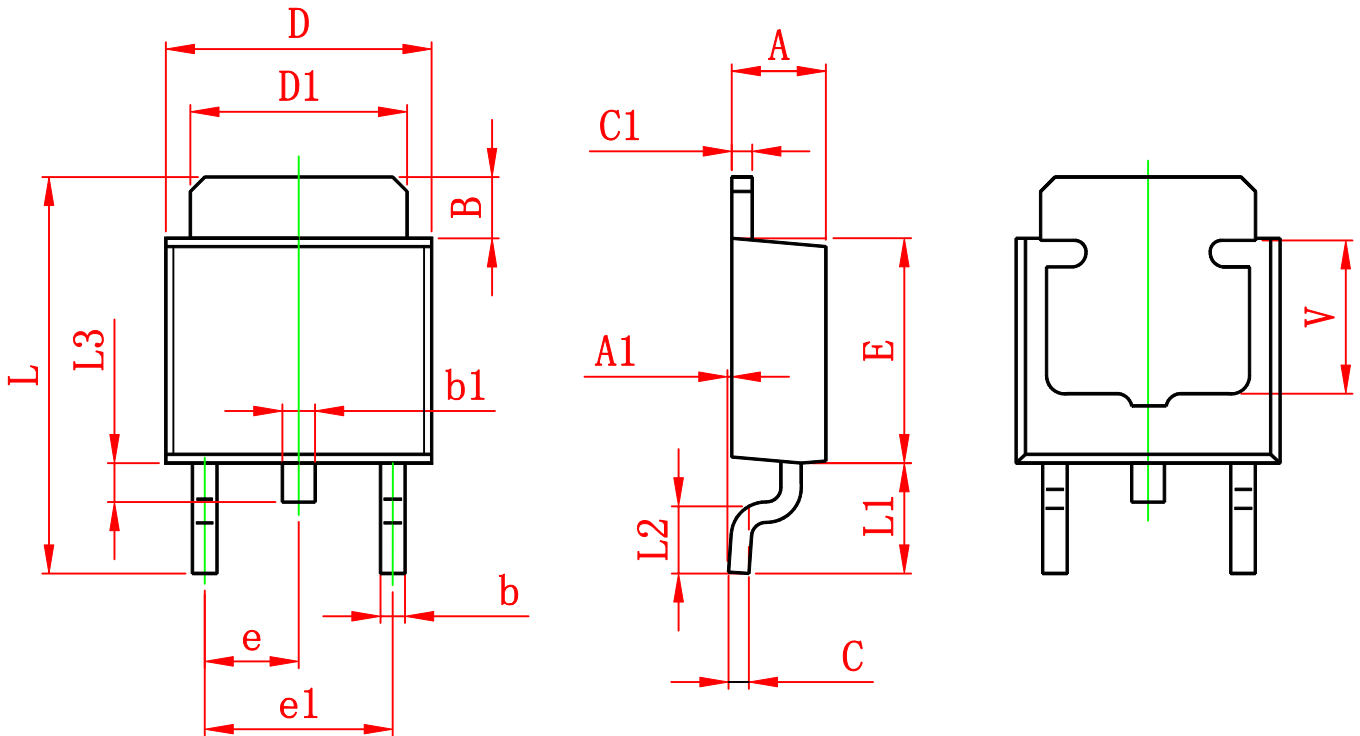


Fig.11 Unclamped Inductive Waveform

$$EAS = \frac{1}{2} L \times (-I_{AS}^2) \times \frac{-BV_{DSS}}{-BV_{DSS} - (-V_{DD})}$$

TO-252 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
B	1.350	1.650	0.053	0.065
b	0.500	0.700	0.020	0.028
b1	0.700	0.900	0.028	0.035
c	0.430	0.580	0.017	0.023
c1	0.430	0.580	0.017	0.023
D	6.350	6.650	0.250	0.262
D1	5.200	5.400	0.205	0.213
E	5.400	5.700	0.213	0.224
e	2.300 TYP.		0.091 TYP.	
e1	4.500	4.700	0.177	0.185
L	9.500	9.900	0.374	0.390
L1	2.550	2.900	0.100	0.114
L2	1.400	1.780	0.055	0.070
L3	0.600	0.900	0.024	0.035
V	3.800 REF.		0.150 REF.	