

Description

The 30P04 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



TO-252

General Features

$V_{DS} = -40V$ $I_D = 30A$

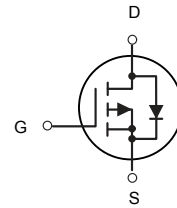
$R_{DS(ON)} < 17m\Omega @ V_{GS}=10V$

Application

Battery protection

Load switch

Uninterruptible power supply



P-Channel MOSFET

Absolute Maximum Ratings ($T_C=25^\circ C$ unless otherwise noted)

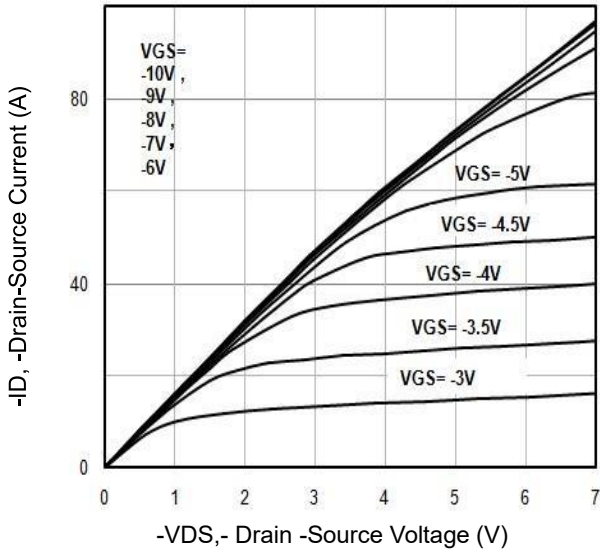
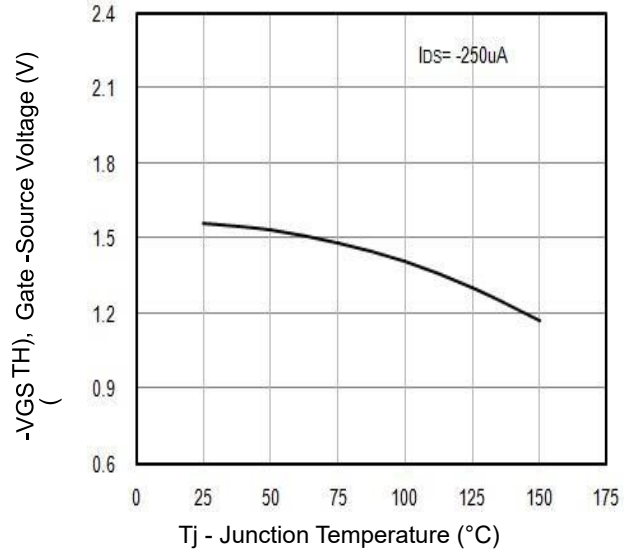
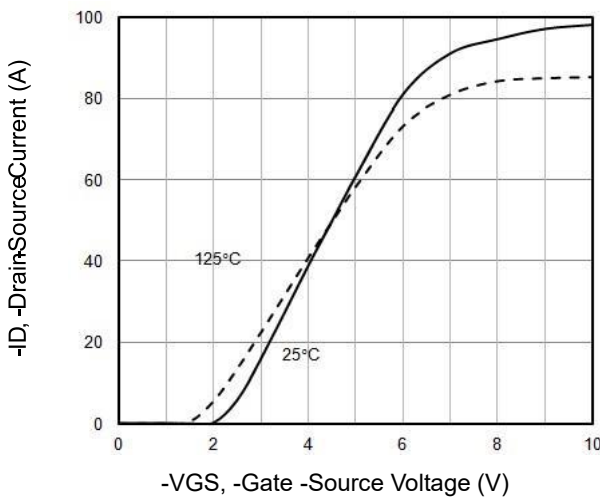
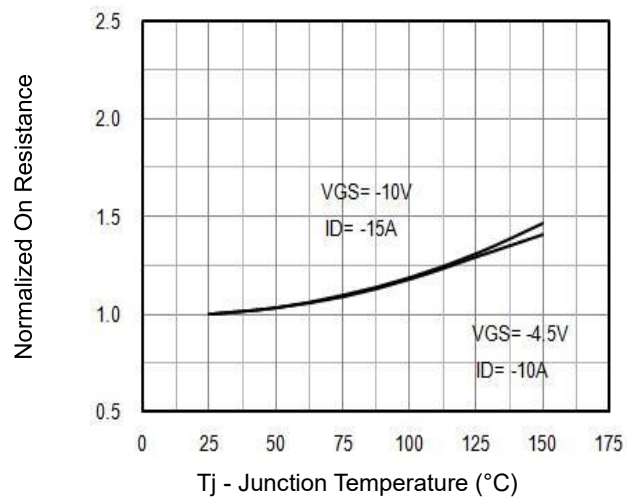
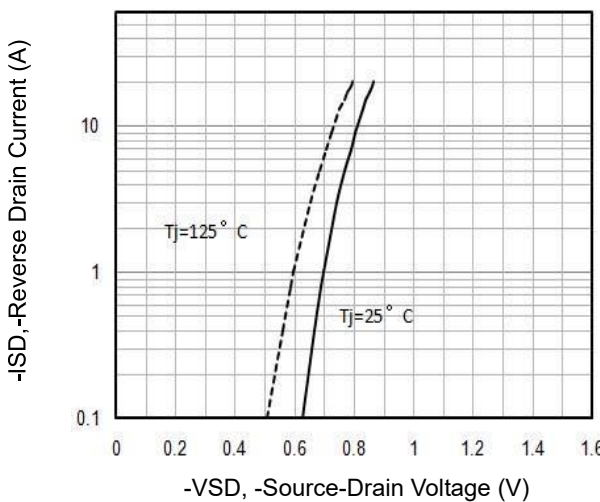
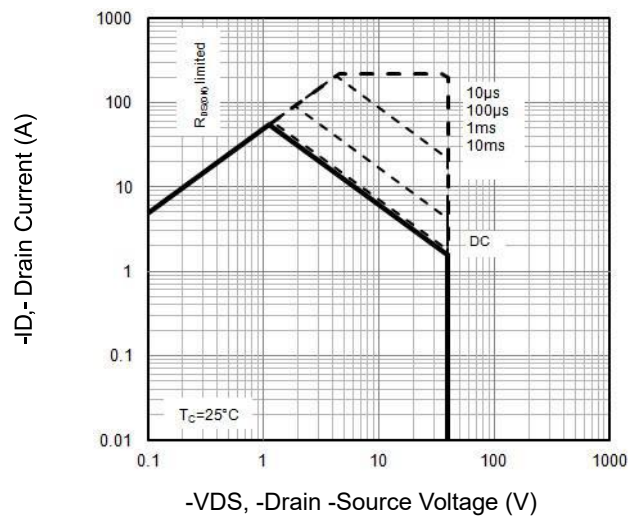
Symbol	Parameter	Rating	Unit	
$V_{(BR)DSS}$	Drain-Source breakdown voltage	-40	V	
I_D	Continuous drain current @ $V_{GS}=-10V$	$T_A=25^\circ C$	-30	A
		$T_A=100^\circ C$	-28	A
I_{DM}	Pulse drain current tested ①	$T_A=25^\circ C$	-180	A
EAS	Avalanche energy, single pulsed ②	100	mJ	
P_D	Maximum power dissipation	$T_A=25^\circ C$	62.5	W
V_{GS}	Gate-Source voltage	± 20	V	
$T_{STG} T_J$	Storage and operating temperature range	-55 to 150	$^\circ C$	
R_{JC}	Thermal Resistance-Junction to Case	2.0	$^\circ C/W$	
R_{JA}	Thermal Resistance Junction-Ambient	100	$^\circ C/W$	

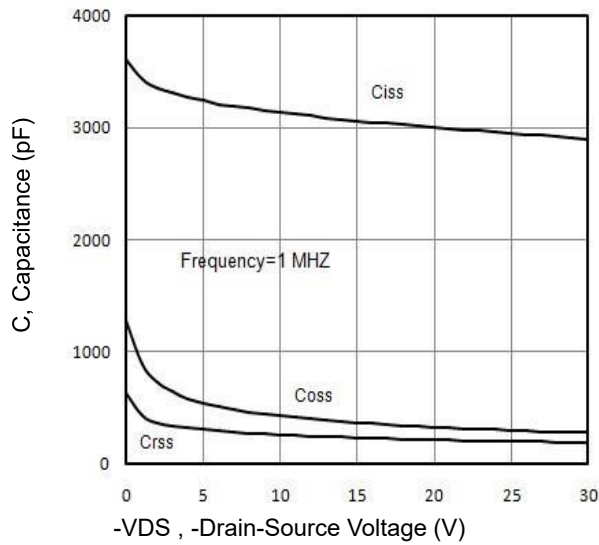
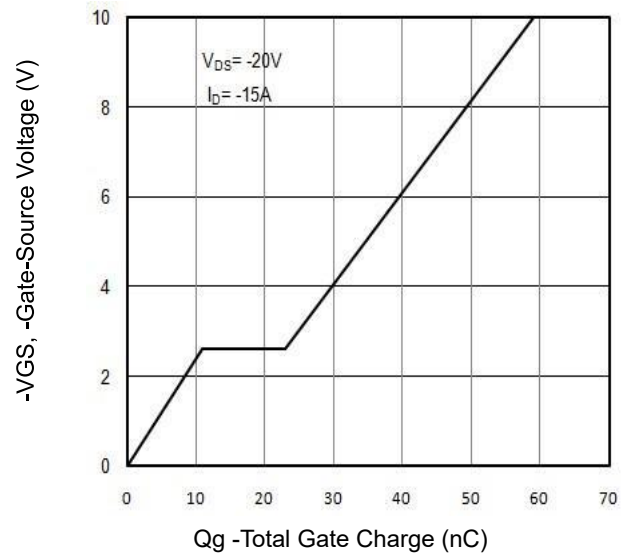
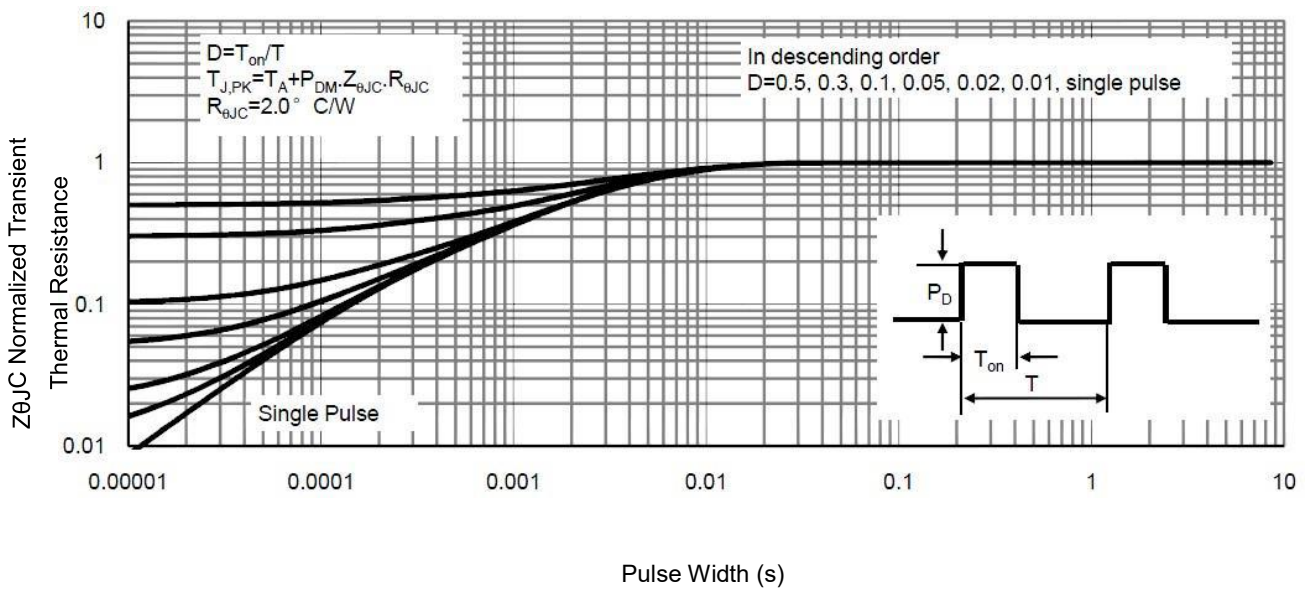
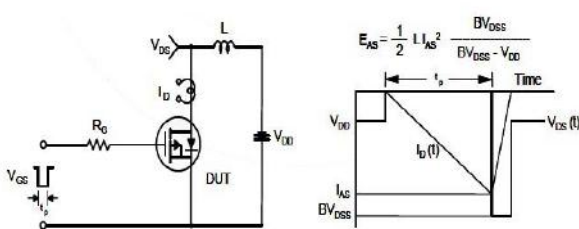
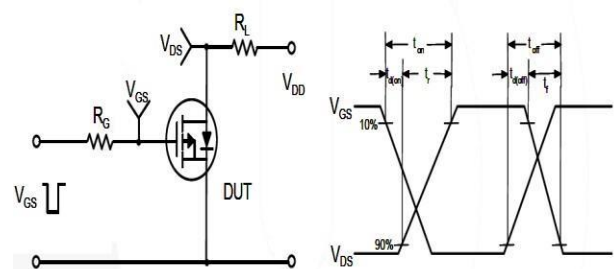
Electrical Characteristics ($T_J=25^\circ C$, unless otherwise noted)

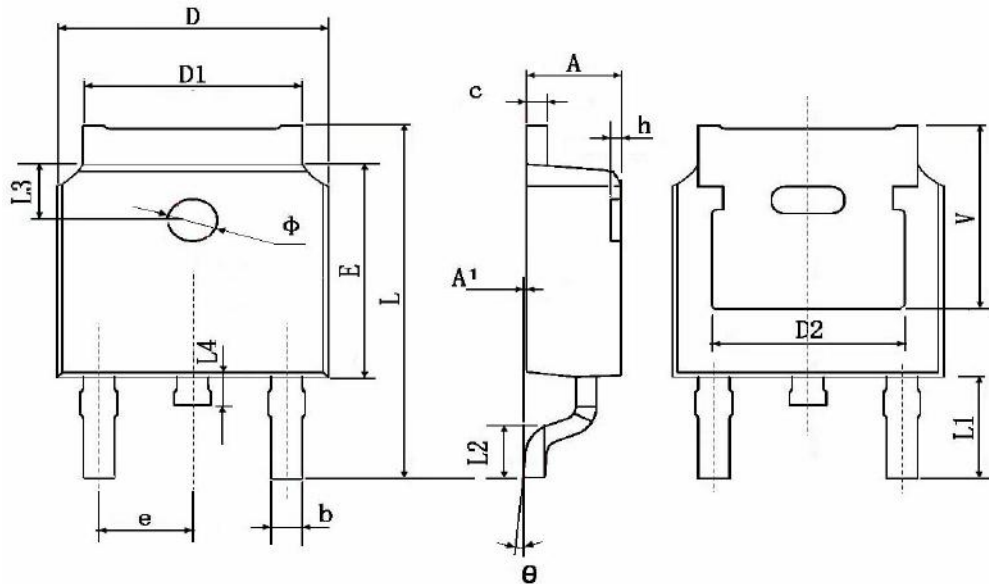
Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-40	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-40V, V_{GS}=0V$	--	--	-1	μA
	Zero Gate Voltage Drain Current ($T_j=125^\circ C$)	$V_{DS}=-40V, V_{GS}=0V$	--	--	-100	μA
I_{GSS}	Gate-Body Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	--	--	± 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 ③	$V_{GS}=-10V, I_D=-15A$	--	13.5	17	m Ω
$R_{DS(ON)}$	Drain-Source On-State Resistance ③	$V_{GS}=-4.5V, I_D=-10A$	--	16.5	20	m Ω
C_{iss}	Input Capacitance	$V_{DS}=-20V, V_{GS}=0V,$ $f=1MHz$	--	3000	--	pF
C_{oss}	Output Capacitance		--	320	--	pF
C_{rss}	Reverse Transfer Capacitance		--	210	--	pF
R_g	Gate Resistance	$f=1MHz$		15.6		Ω
Q_g	Total Gate Charge	$V_{DS}=-20V, I_D=-15A,$ $V_{GS}=-10V$	--	59	--	nC
Q_{gs}	Gate-Source Charge		--	11	--	nC
Q_{gd}	Gate-Drain Charge		--	12	--	nC
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=-20V, I_D=-15A,$ $R_G=3.0\Omega,$ $V_{GS}=-10V$	--	8.6	--	nS
t_r	Turn-on Rise Time		--	11	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	51	--	nS
t_f	Turn-Off Fall Time		--	14	--	nS
V_{SD}	Forward on voltage	$I_{SD}=-15A, V_{GS}=0V$	--	-0.85	-1.2	V
t_{rr}	Reverse Recovery Time	$T_j=25^\circ C, I_{sd}=-15A,$ $V_{GS}=0V, di/dt=-500A/\mu s$	--	13	--	nS
Q_{rr}	Reverse Recovery Charge				21	

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.
- 2.The data tested by pulsed , pulse width .The EAS data shows Max. rating .
- 3.The test cond $\leq 300\mu s$, duty cycle ition is $V_{DD}=-25\leq V, V_{GS} =10V, L=0.1mH, I_{AS}=53.8A$
- 4.The power dissipation is limited by 175 $^\circ C$ junction temperature
- 5.The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

Typical Characteristics

Fig1. Typical Output Characteristics

Fig2. $-V_{GS(TH)}$ Gate -Source Voltage Vs. T_j

Fig3. Typical Transfer Characteristics

Fig4. Normalized On-Resistance Vs. T_j

Fig5. Typical Source-Drain Diode Forward Voltage

Fig6. Maximum Safe Operating Area


Fig7. Typical Capacitance Vs. Drain-Source Voltage

Fig8. Typical Gate Charge Vs. Gate-Source Voltage

Fig9. Normalized Maximum Transient Thermal Impedance

Fig10. Unclamped Inductive Test Circuit and Waveforms

Fig11. Switching Time Test Circuit and waveforms

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	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	