

3090K

N-Channel Trench Power MOSFET

General Description

The 3090K 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 wide variety of applications.

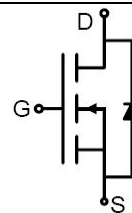
Features

- $V_{DS} = 30V, I_D = 86A$
 $R_{DS(ON)} < 5 m\Omega @ V_{GS} = 10V$
 $R_{DS(ON)} < 9.5m\Omega @ V_{GS} = 4.5V$
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

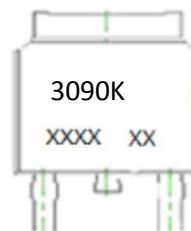
Application

- PWM applications
- Load switch
- Power management

100% UIS TESTED!
100% ΔV_{ds} TESTED!



Schematic Diagram



Marking and pin Assignment



TO-252(DPAK) top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
3090K	3090K	TO-252	325mm	16mm	2500

Table 1. Absolute Maximum Ratings ($T_A=25^\circ C$)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage ($V_{GS}=0V$)	30	V
V_{GS}	Gate-Source Voltage ($V_{DS}=0V$)	± 20	V
I_D	Drain Current-Continuous($T_c=25^\circ C$) (Note 1)	90	A
	Drain Current-Continuous($T_c=100^\circ C$)	60	A
$I_{DM (pluse)}$	Drain Current-Continuous@ Current-Pulsed (Note 2)	344	A
P_D	Maximum Power Dissipation($T_c=25^\circ C$)	84	W
	Maximum Power Dissipation($T_c=100^\circ C$)	42	W
E_{AS}	Avalanche energy (Note 3)	270	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 175	$^\circ C$

Table 2. Thermal Characteristic

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	-	1.8	$^\circ C/W$

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Table 3. Electrical Characteristics (TA=25°C unless otherwise noted)

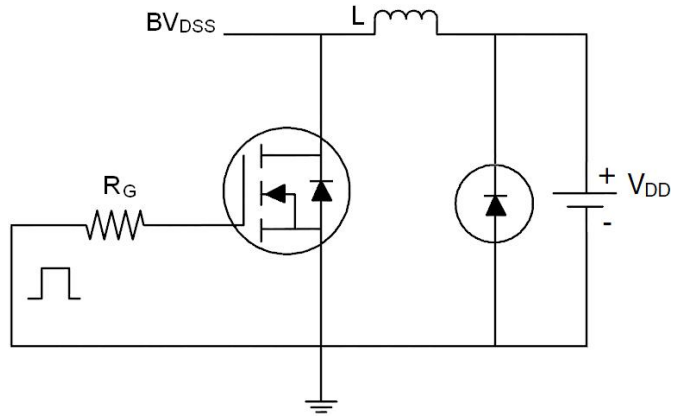
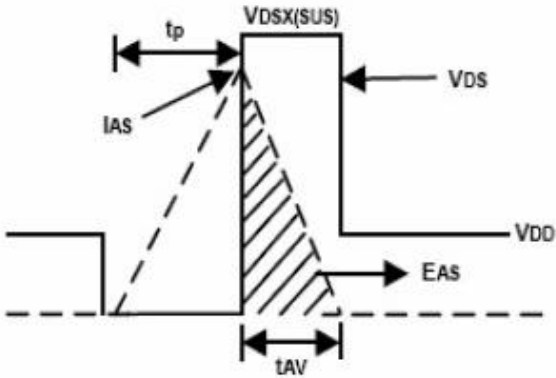
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=30V, V_{GS}=0V$			1	μA
I_{GSS}	Gate-Body Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.5	2.5	V
g_{FS}	Forward Transconductance	$V_{DS}=5V, I_D=15A$		20		S
$R_{DS(ON)}$	Drain-Source On-State Resistance	$V_{GS}=10V, I_D=20A$		4.0	5	m Ω
		$V_{GS}=4.5V, I_D=20A$		5.8	9.5	m Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=15V, V_{GS}=0V, f=1.0MHz$		1980		pF
C_{oss}	Output Capacitance			320		pF
C_{riss}	Reverse Transfer Capacitance			240		pF
R_g	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1.0MHz$		3.2		Ω
Switching Times						
$t_{d(on)}$	Turn-on Delay Time	$V_{GS}=10V, V_{DS}=15V, R_L=0.75\Omega, R_{GEN}=3\Omega$		12		nS
t_r	Turn-on Rise Time			36		nS
$t_{d(off)}$	Turn-Off Delay Time			49		nS
t_f	Turn-Off Fall Time			12		nS
Q_g	Total Gate Charge	$V_{GS}=10V, V_{DS}=25V, I_D=14A$		45		nC
Q_{gs}	Gate-Source Charge			3		nC
Q_{gd}	Gate-Drain Charge			15		nC
Source-Drain Diode Characteristics						
I_{SD}	Source-Drain Current(Body Diode)				90	A
V_{SD}	Forward on Voltage	$V_{GS}=0V, I_S=20A$			1.2	V
t_{rr}	Body Diode Reverse Recovery Time	$I_F=20A, dI/dt=100A/\mu s$		15		ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=20A, dI/dt=100A/\mu s$		4		nC

Notes 1.The maximum current rating is package limited.

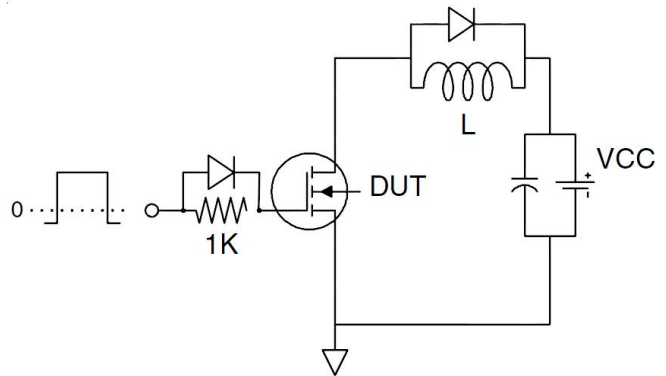
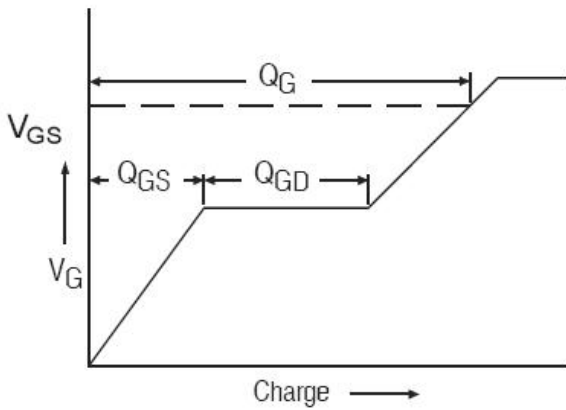
Notes 2.Repetitive Rating: Pulse width limited by maximum junction temperature Notes 3.EAS condition: $T_J=25^\circ C, V_{DD}=30V, V_G=10V, R_G=25\Omega$

Test Circuit

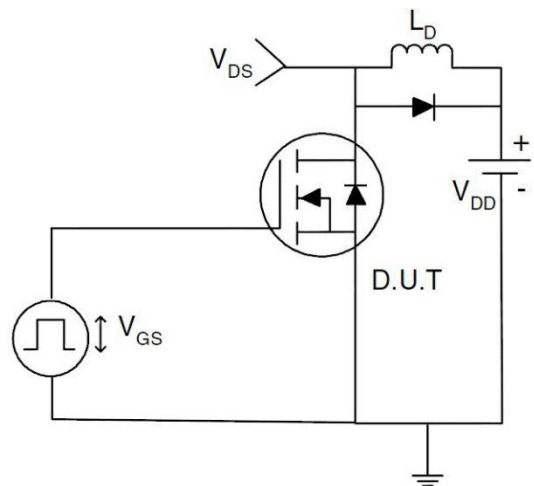
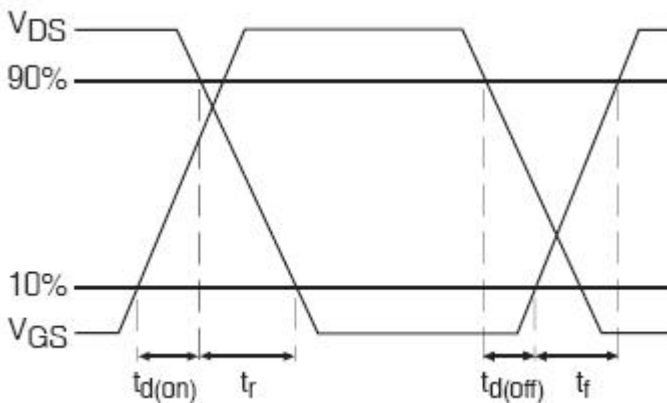
1) E_{AS} Test Circuits



2) Gate Charge Test Circuit:



3) Switch Time Test Circuit:



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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)

Figure 1. Output Characteristics

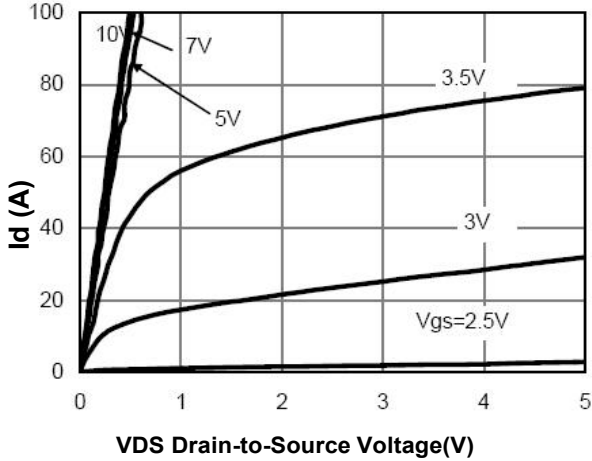


Figure 2. Transfer Characteristics

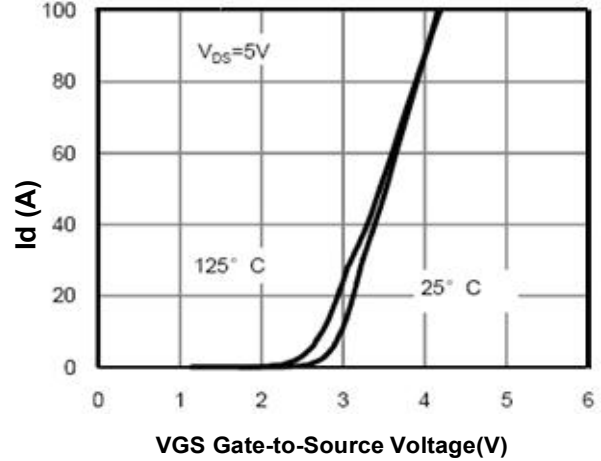


Figure 3. Max BV_{DSS} vs Junction Temperature

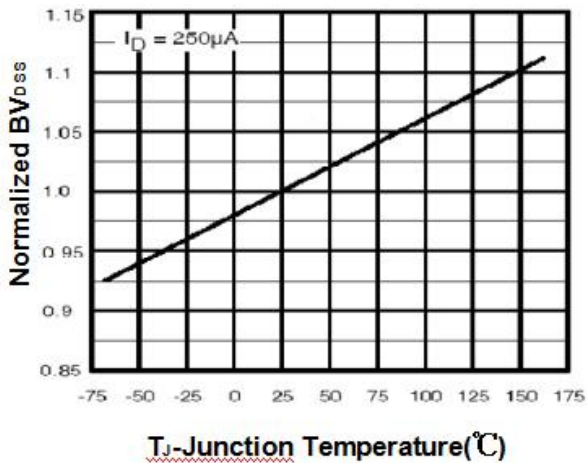


Figure 4. Drain Current

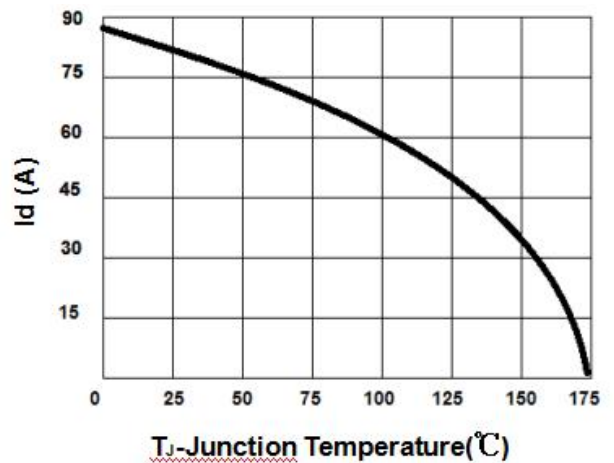


Figure 5. $V_{GS(th)}$ vs Junction Temperature

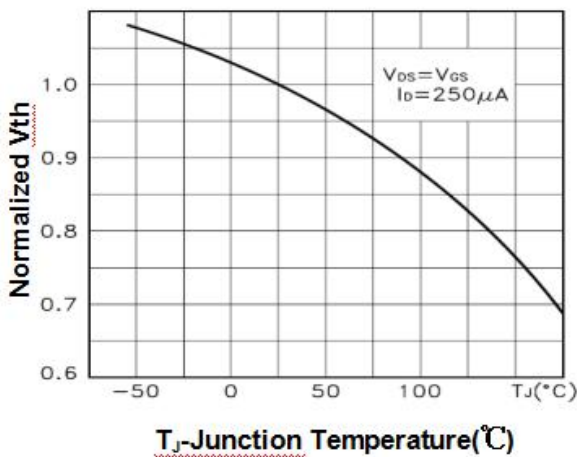
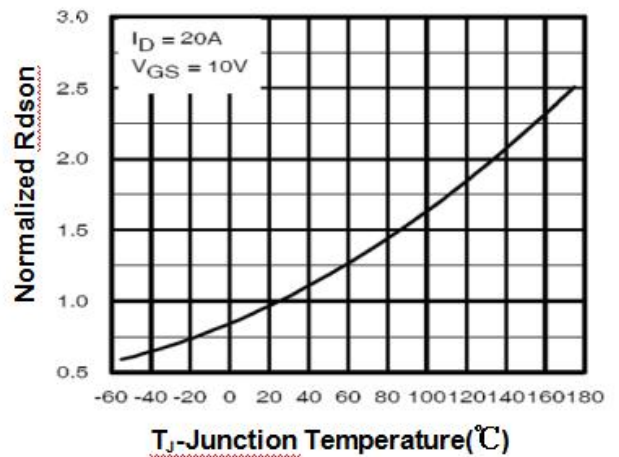
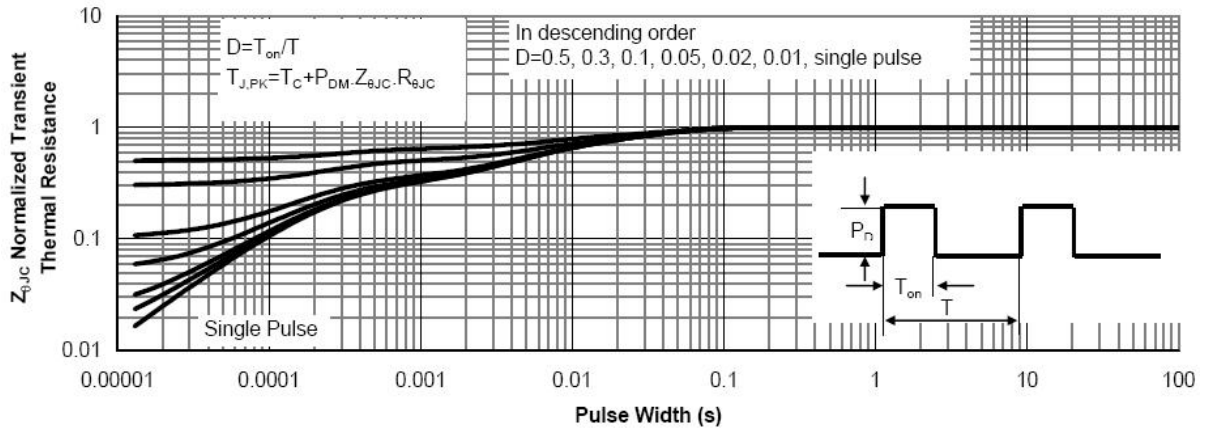
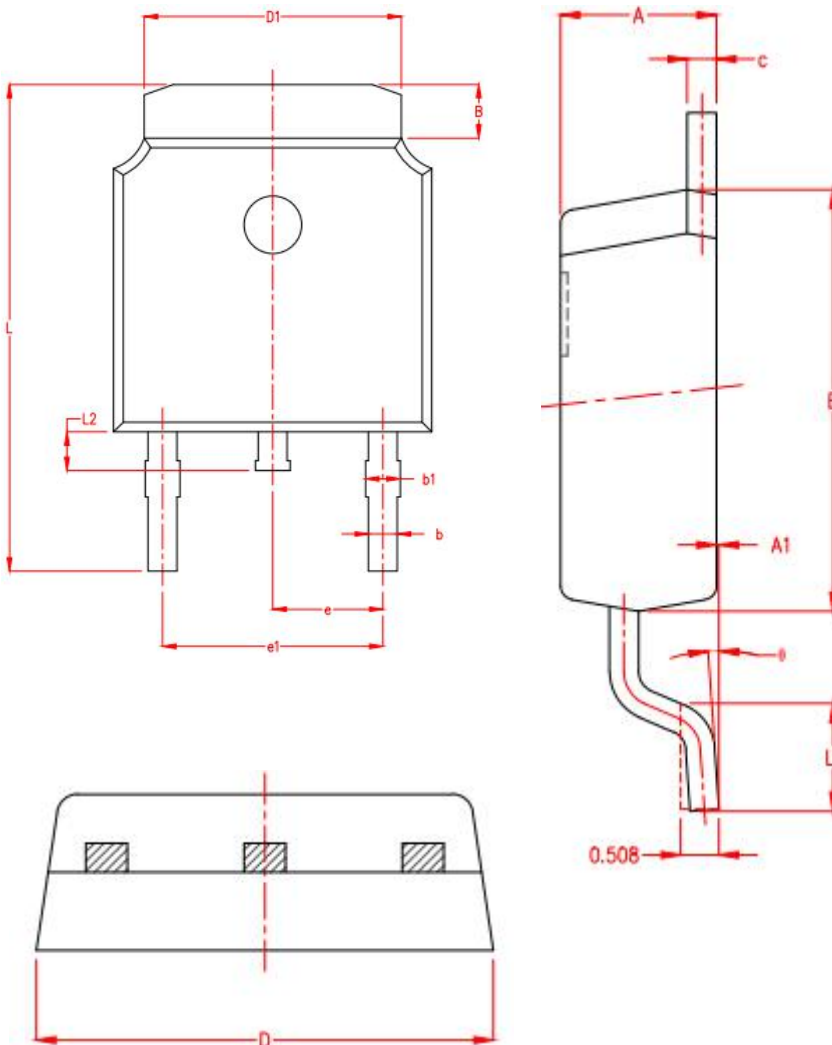


Figure 6. $R_{DS(ON)}$ vs Junction Temperature





TO-252 Package Information.



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	2.15	2.25	2.35
A1	0.00	0.06	0.12
B	0.96	1.11	1.26
b	0.59	0.69	0.79
b1	0.69	0.81	0.93
c	0.34	0.42	0.50
D	6.45	6.60	6.75
D1	5.23	5.33	5.43
E	5.95	6.10	6.25
e	2.286TYP.		
e1	4.47	4.57	4.67
L	9.90	10.10	10.30
L1	1.40	1.55	1.70
L2	0.60	0.80	1.00
θ	0°	4°	8°