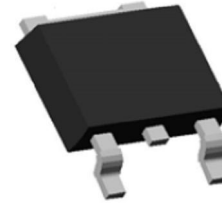
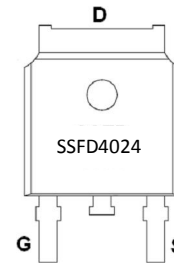


Main Product Characteristics

V_{DSS}	40V
$R_{DS(on)}$	30 mohm
I_D	12A



TO-252 Top View



Marking and Pin Assignment

Features and Benefits

- Advanced trench MOSFET process technology
- Special designed for Convertors and power controls
- Ultra low on-resistance
- 175°C operating temperature
- Lead free product

Description

It utilizes the latest trench processing techniques to achieve extremely low on resistance, fast switching speed and high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in automotive applications and a wide variety of other applications.

Absolute Max Rating

	Parameter	Max.	Units
ID @ TC = 25°C	Continuous Drain Current, VGS @ 10V	12	A
ID @ TC = 100°C	Continuous Drain Current, VGS @ 10V	12	
IDM	Pulsed Drain Current ^①	30	
PD @TC = 25°C	Power Dissipation	20	W
VGS	Gate-to-Source Voltage	± 20	V
EAS	Single Pulse Avalanche Energy ^②	22	mJ
IAR	Avalanche Current @ L=0.3mH	10	A
TJ TSTG	Operating Junction and Storage Temperature Range	-55 to + 175	°C

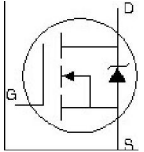
Thermal Resistance

Symbol	Characterizes	Value	Unit
$R_{\theta JC}$	Junction-to-case	7.5	°C/W
$R_{\theta JA}$	Junction-to-ambient	30	°C/W
	Junction-to-Ambient (PCB mounted, steady-state)	60	°C/W

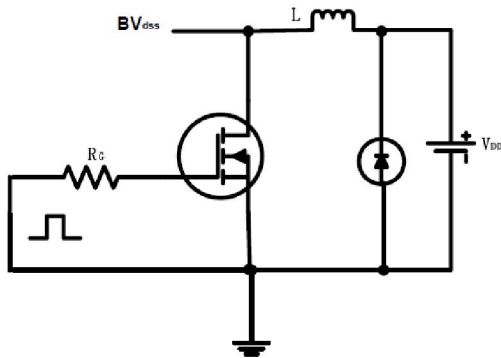
Electrical Characteristics @ $T_A=25^{\circ}\text{C}$ unless otherwise specified

	Parameter	Min.	Typ.	Max	Units	Conditions
BVDSS	Drain-to-Source breakdown voltage	40	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
RDS(on)	Static Drain-to-Source on-resistance	—	24	33	m Ω	$V_{GS} = 10V, I_D = 12A$ ③
VGS(th)	Gate threshold voltage	1	—	3	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
IDSS	Drain-to-Source leakage current	—	—	1	μA	$V_{DS} = 40V, V_{GS} = 0V$
		—	—	150		$V_{DS} = 40V, V_{GS} = 0V, T_J = 125^{\circ}\text{C}$
IGSS	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source reverse leakage	—	—	-100		$V_{GS} = -20V$
Qg	Total gate charge	—	9.5	—	nC	$I_D = 12A, V_{DS} = 20V, V_{GS} = 10V$ ③
Qgs	Gate-to-Source charge	—	4.5	—		
Qgd	Gate-to-Drain("Miller") charge	—	1.5	—		
td(on)	Turn-on delay time	—	3.5	—	ns	$V_{DD} = 20V, I_D = 12A, R_G = 1.7\Omega, V_{GS} = 10V$ ③
tr	Rise time	—	6	—		
td(off)	Turn-Off delay time	—	13.5	—		
tf	Fall time	—	3.5	—		
Ciss	Input capacitance	—	410	—	pF	$V_{GS} = 0V, V_{DS} = 20V, f = 1.0\text{MHz}$
Coss	Output capacitance	—	95	—		
Crss	Reverse transfer capacitance	—	35	—		

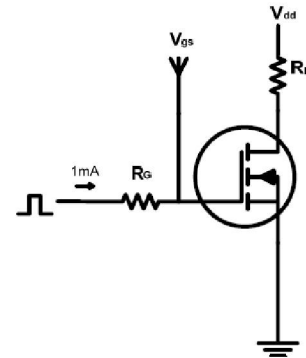
Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max	Units	Conditions
IS	Continuous Source Current (Body Diode)	—	—	12	A	MOSFET symbol showing the integral reverse p-n junction diode. 
VSD	Diode Forward Voltage	—	0.75	1.0	V	$T_J = 25^{\circ}\text{C}, I_F = 1A, V_{DD} = 20V, di/dt = 100A/\mu s$ ③
trr	Reverse Recovery Time	—	23	—	ns	$T_J = 25^{\circ}\text{C}, I_F = 12A, V_{DD} = 20V, di/dt = 100A/\mu s$ ③
Qrr	Reverse Recovery Charge	—	18.5	—	nC	
ton	Forward Turn-on Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

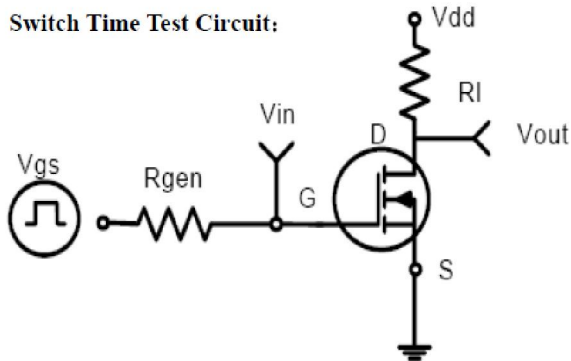
EAS test circuits:



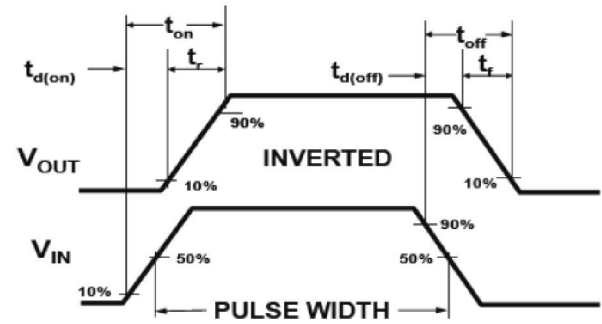
Gate charge test circuit:



Switch Time Test Circuit:



Switch Waveforms:



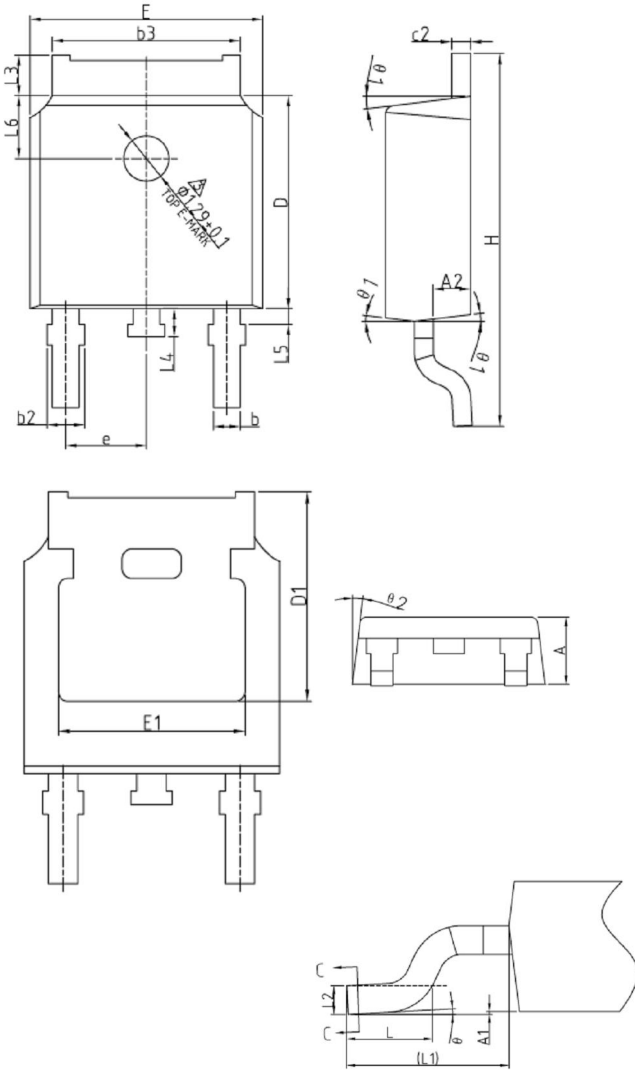
Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Limited by T_{Jmax} , starting $T_J = 25^\circ C$, $L = 0.3mH$, $R_G = 50\Omega$, $I_{AS} = 82A$, $V_{GS} = 10V$. Part not recommended for use above this value.
- ③ Pulse width $< 1.0ms$; duty cycle $< 2\%$.

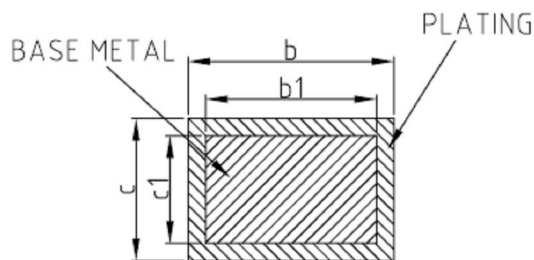
TO-252E-2-M PACKAGE INFORMATION

Dimensions in Millimeters

UNITS: mm



SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0	—	0.10
A2	0.90	1.01	1.10
b	0.72	—	0.85
b1	0.71	0.76	0.81
b2	0.72	—	0.90
b3	5.13	5.33	5.46
c	0.47	—	0.60
c1	0.46	0.51	0.56
c2	0.47	—	0.60
D	6.00	6.10	6.20
D1	5.25	—	—
E	6.50	6.60	6.70
E1	4.70	—	—
e	2.186	2.286	2.386
H	9.80	10.10	10.40
L	1.40	1.50	1.70
L1	2.90REF		
L2	0.51BSC		
L3	0.90	—	1.25
L4	0.60	0.80	1.00
L5	0.15	—	0.75
L6	1.80REF		
θ	0°	—	8°
θ 1	5°	7°	9°
θ 2	5°	7°	9°



NOTES:

1. Dimensions are inclusive of plating
2. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 6 mils.
3. Dimension L is measured in gauge plane.
4. Controlling dimension is millimeter; converted inch dimensions are not necessarily exact.