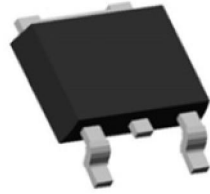


### Main Product Characteristics:

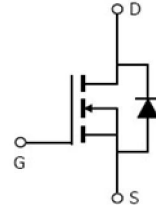
$V_{DSS}$	25V
$R_{DS(on)}$	8mohm
$I_D$	55A



TO-252 DPAK



Marking and pin assignment



### Features and Benefits:

- Advanced trench MOSFET process technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 175°C operating temperature
- Lead free product

### Description:

It utilizes the latest FRRMOS (fast reverse recovery MOS) trench processing techniques to achieve extremely low on resistance, fast switching speed and short reverse recovery time. These features combine to make this design an extremely efficient and reliable device for use in PWM, load switching and a wide variety of other applications

### Absolute Max Rating:

Symbol	Parameter	Max.	Units
$I_D @ TC = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	55	A
$I_D @ TC = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	45	
IDM	Pulsed Drain Current②	120	
ISM	Pulsed Source Current (Body Diode)②	120	
$PD @ TC = 25^\circ C$	Power Dissipation③	50	W
$PD @ TC = 100^\circ C$	Power Dissipation③	25	W
VDS	Drain-Source Voltage	25	V
VGS	Gate-to-Source Voltage	$\pm 20$	V
EAS	Single Pulse Avalanche Energy @ $L=0.1mH$ ②	80	mJ
IAR	Avalanche Current @ $L=0.1mH$ ②	40	A
TJ TSTG	Operating Junction and Storage Temperature Range	-55 to + 175	°C

### Thermal Resistance

Symbol	Characterizes	Value	Unit
$R_{\theta JC}$	Junction-to-case③	2.5	°C/W
$R_{\theta JA}$	Junction-to-ambient ( $t \leq 10s$ ) ④	14	°C/W
	Junction-to-Ambient (PCB mounted, steady-state) ④	38	°C/W

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

Symbol	Parameter	Min.	Typ.	Max	Units	Conditions
BVDSS	Drain-to-Source breakdown voltage	25	—	—	V	$V_{GS} = 0V$ , $I_D = 250\mu A$
RDS(on)	Static Drain-to-Source on-resistance	—	6	8	m $\Omega$	$V_{GS} = 10V$ , $I_D = 30A$
VGS(th)	Gate threshold voltage	1.5	2	2.5	V	$V_{DS} = V_{GS}$ , $I_D = 250\mu A$
IDSS	Drain-to-Source leakage current	—	—	10	$\mu A$	$V_{DS} = 25V$ , $V_{GS} = 0V$
		—	—	50		$V_{DS} = 25V$ , $V_{GS} = 0V$ , $T_J = 55^\circ\text{C}$
IGSS	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source reverse leakage	-100	—	—		$V_{GS} = -20V$
Qg	Total gate charge	—	20.6	25	nC	$I_D = 30A$ , $V_{DS} = 12.5V$ , $V_{GS} = 10V$
Qgs	Gate-to-Source charge	—	5.3	6		
Qgd	Gate-to-Drain("Miller") charge	—	5.9	6.5		
Qg(th)	Gate charge at shreshold	—	2.6	3		
Vplateau	gate plateau voltage	—	4.1	5	V	
td(on)	Turn-on delay time	—	10.4	—	ns	$V_{GS} = 10V$ , $V_{DS} = 15V$ , $R_L = 10\Omega$ , $R_{GEN} = 3\Omega$
tr	Rise time	—	6.4	—		
td(off)	Turn-Off delay time	—	22.4	—		
tf	Fall time	—	7.2	—		
Ciss	Input capacitance	—	1210	—	pF	$V_{GS} = 0V$ , $V_{DS} = 15V$ , $f = 1.0\text{MHz}$
Coss	Output capacitance	—	320	—		
Crss	Reverse transfer capacitance	—	220	—		
R <sub>g</sub>	Gate resistance	—	1.5	—	$\Omega$	$V_{GS} = 0V$ , $V_{DS} = 0V$ , $f = 1\text{MHz}$

### Source-Drain Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max	Units	Conditions
IS	Maximum Body-Diode Continuous Current		55	—	A	
VSD	Diode Forward Voltage	—	0.7	1	V	$I_S = 1A$ , $V_{GS} = 0V$
trr	Reverse Recovery Time	—	9.5	—	ns	$T_J = 25^\circ\text{C}$ , $I_F = 30A$ ,
Qrr	Reverse Recovery Charge	—	3.8	—	nC	$V_{DD} = 30V$ , $di/dt = 200A/\mu s$
ton	Forward Turn-on Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

### Typical Electrical and Thermal Characteristics

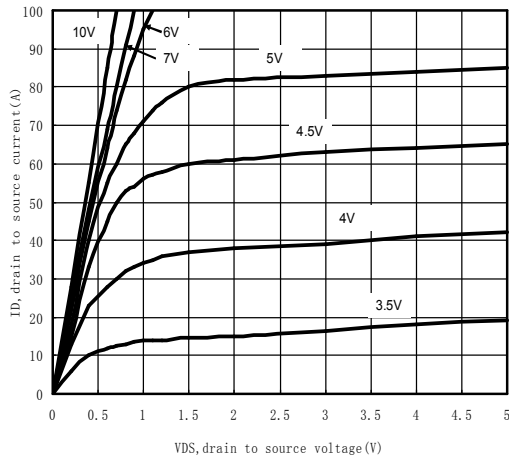


Figure 1: Typical Output Characteristics

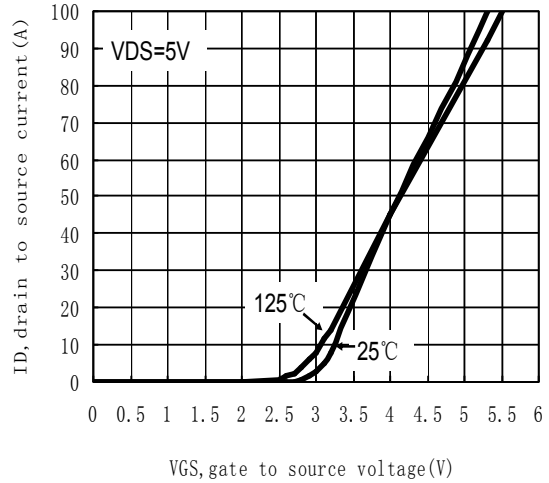


Figure 2: Typical Transfer Characteristics

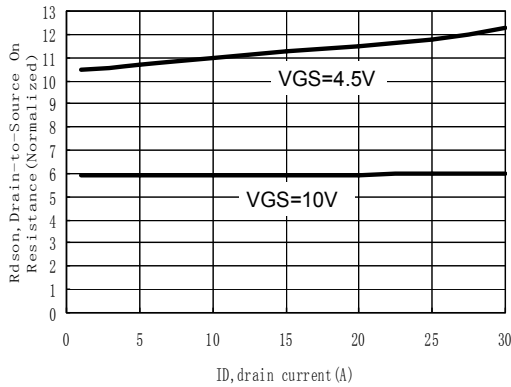


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

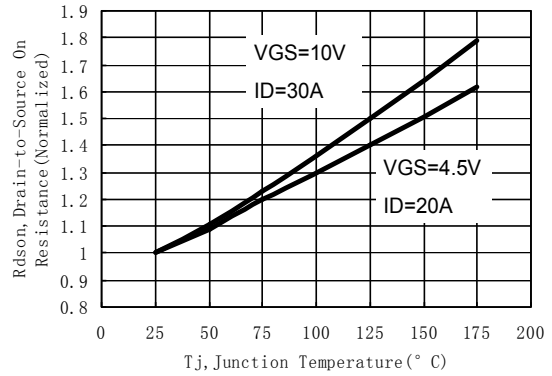


Figure 4: On-Resistance vs. Junction Temperature

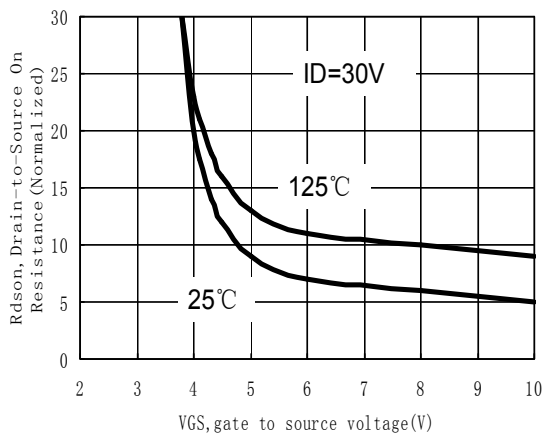


Figure 5: On-Resistance vs. Gate-Source Voltage

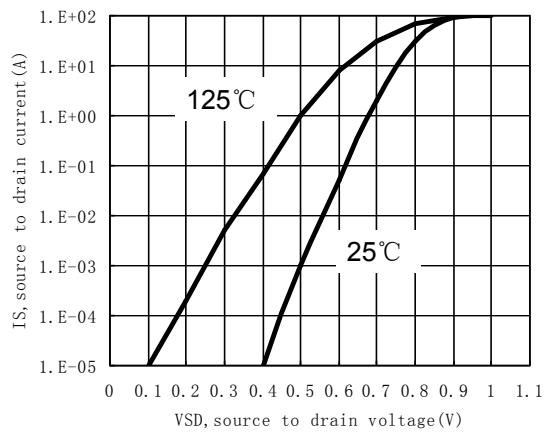


Figure 6: Body-Diode Characteristics

### Typical Electrical and Thermal Characteristics

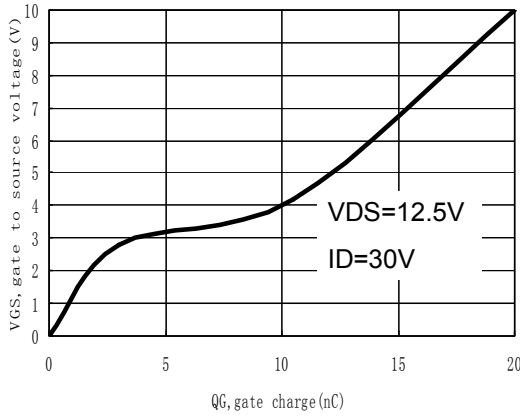
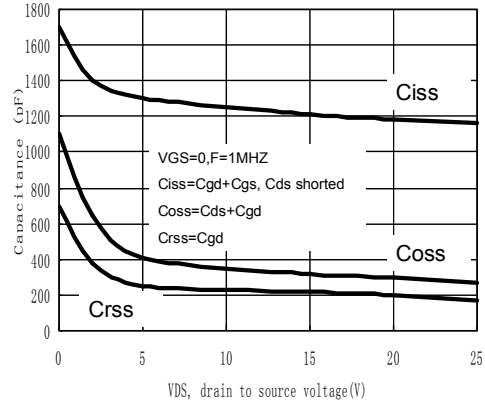


Figure 7: Gate-Charge Characteristics Figure



8: Capacitance Characteristics

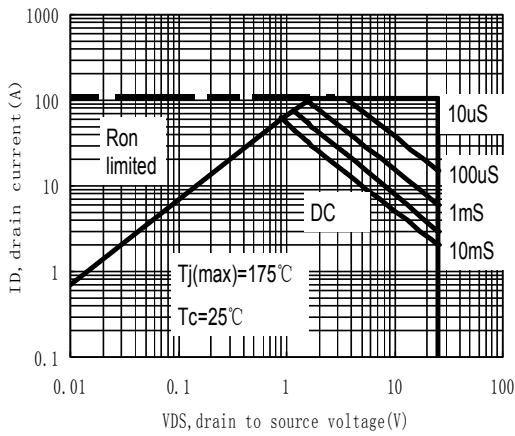


Figure 9: Maximum Forward Biased Safe Operating Area (SOA)

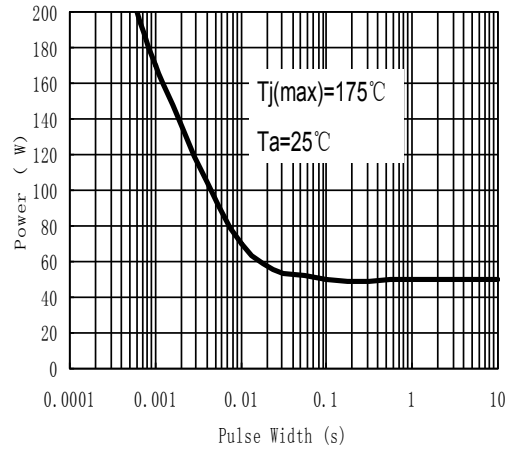


Figure 10: Single Pulse Power Rating Junction-to-Case (JC)

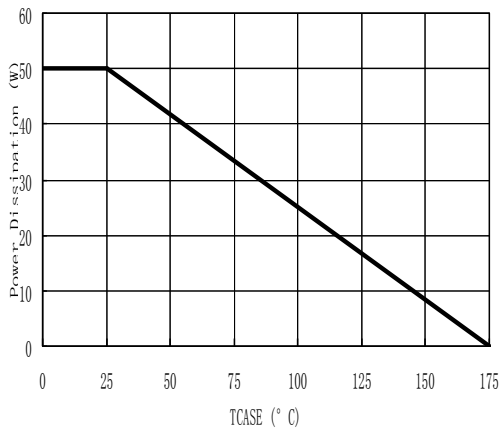


Figure 11: Power De-rating (JC)

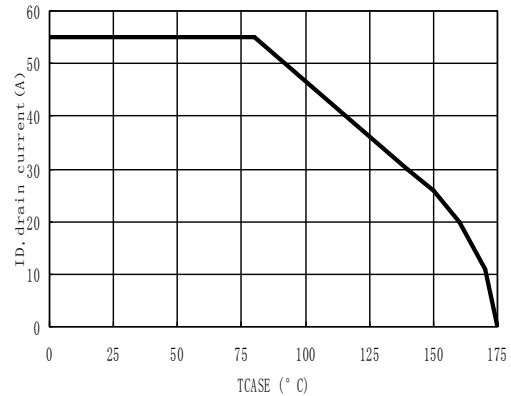
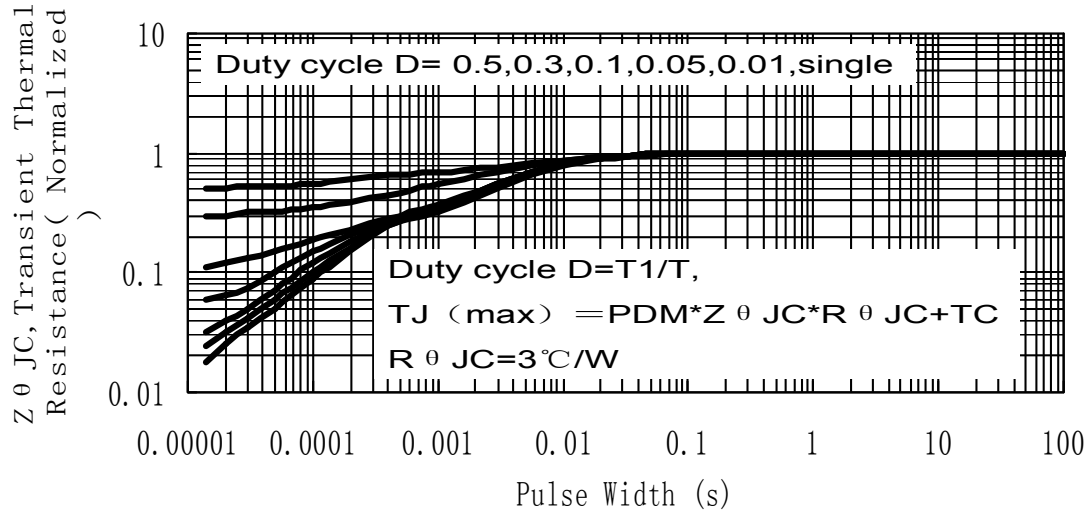
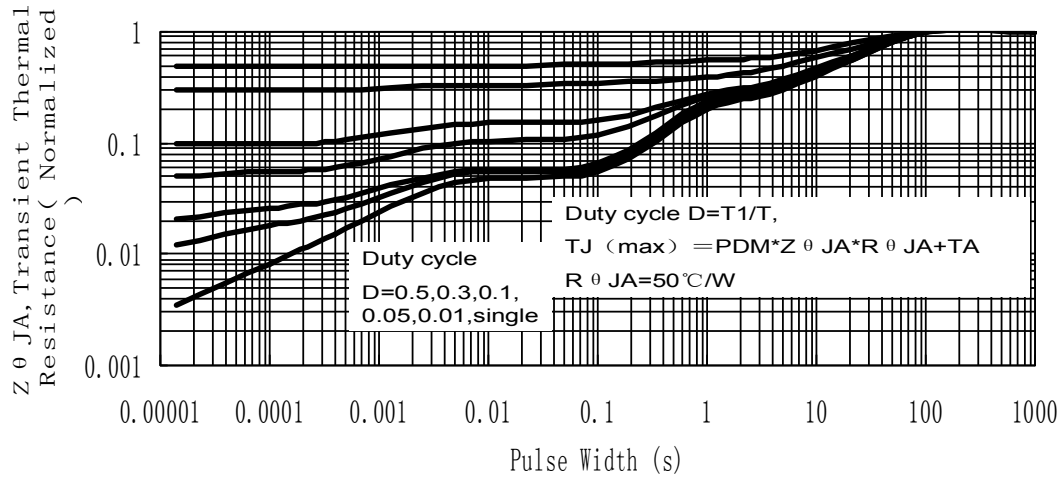


Figure 12: Current De-rating (JC)

**Typical Electrical and Thermal Characteristics**

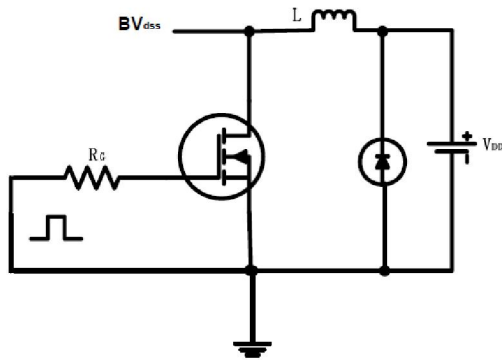


**Figure 13: Normalized Maximum Transient Thermal Impedance (Ⓔ)**

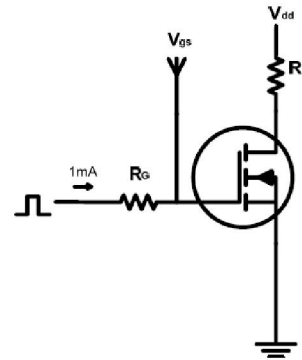


**Figure 14: Normalized Maximum Transient Thermal Impedance (Ⓔ)**

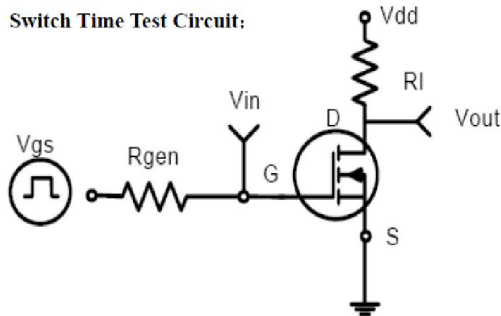
EAS test circuits:



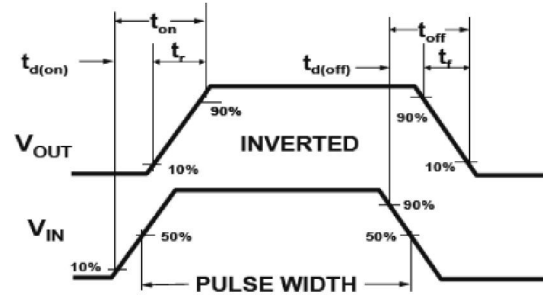
Gate charge test circuit:



Switch Time Test Circuit:



Switch Waveforms:



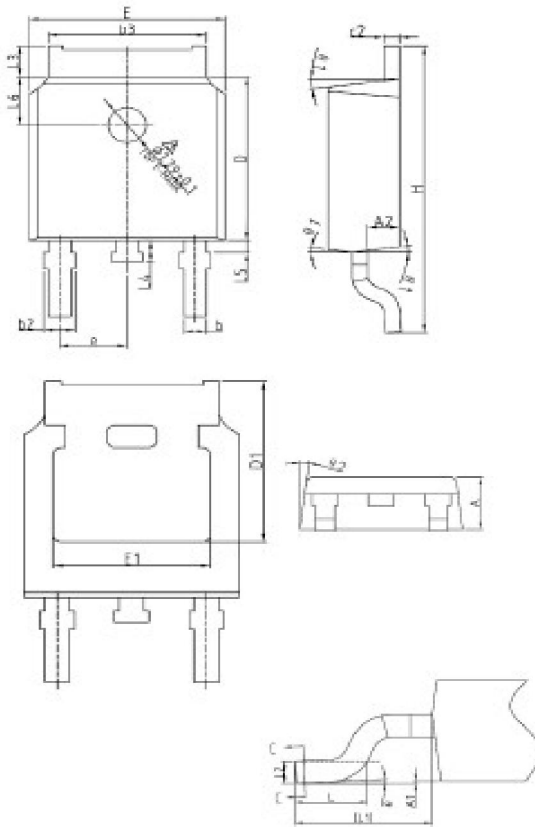
### Notes:

- ① The maximum current rating is limited by bond-wires.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.
- ④ The value of  $R_{\theta JA}$  is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^\circ\text{C}$
- ⑤ These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of  $T_J(\text{MAX}) = 175^\circ\text{C}$ .
- ⑥ The maximum current rating is limited by bond-wires.

## Mechanical Data:

### TO-252E-2-M PACKAGE INFORMATION

#### Dimensions in Millimeters



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°

