

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D$
20V	6.3mΩ@4.5V	50A

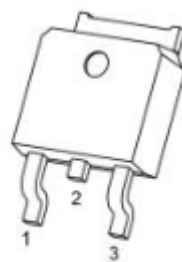
## Feature

- $V_{DS} = 20V, I_D = 50A$
- $R_{DS(ON)} < 8m\Omega @ V_{GS} = 4.5V$
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high  $E_{AS}$
- Excellent package for good heat dissipation

## Applications

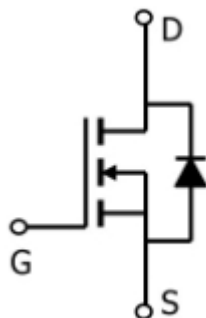
- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

## Package



**TO-252(G:1 D:2 S:3)**

## Circuit diagram



## Marking



## Absolute maximum ratings

(T<sub>a</sub>=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DS</sub>	20	V
Gate-Source Voltage	V <sub>GS</sub>	±12	V
Drain Current, V <sub>GS</sub> @ 4.5V <sup>3</sup>	I <sub>D</sub> @T <sub>A</sub> =25°C	50	A
Drain Current, V <sub>GS</sub> @ 4.5V <sup>3</sup>	I <sub>D</sub> @T <sub>A</sub> =70°C	38	A
Pulsed Drain Current <sup>1</sup>	I <sub>DM</sub>	120	A
Total Power Dissipation	P <sub>D</sub> @T <sub>A</sub> =25°C	3.13	W
Maximum Thermal Resistance, Junction-case	R <sub>thj-c</sub>	5	°C/W
Maximum Thermal Resistance, Junction-ambient <sup>3</sup>	R <sub>thj-a</sub>	40	°C/W
Storage Temperature Range	T <sub>STG</sub>	-55 to 150	°C
Operating Junction Temperature Range	T <sub>J</sub>	-55 to 150	°C

## Electrical characteristics

( $T_A=25^{\circ}\text{C}$ , unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	20			V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 4.5V, I_D = 20A$		6.3	8	mΩ
		$V_{GS} = 2.5V, I_D = 12A$		8	13	
Gate threshold voltage <sup>2</sup>	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	0.5	0.7	1.2	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS} = 16V, V_{GS} = 0V$			10	μA
Gate-body leakage current	$I_{GSS}$	$V_{GS} = \pm 12V, V_{DS} = 0V$			±100	μA
Forward Transconductance	$g_{FS}$	$V_{DS} = 5V, I_D = 20A$		130		S
Switching Characteristics						
Total Gate Charge(4.5V)	$Q_g$	$I_D = 20A, V_{DS} = 10V, V_{GS} = 4.5V$		62	99.2	nC
Gate-Source Charge	$Q_{gS}$			4		
Gate-Drain Charge	$Q_{gd}$			21		
Turn-On Delay Time	$T_{d(on)}$	$V_{DS} = 10V, I_D = 1A, R_G = 3.3\Omega, V_{GS} = 5V$		12		nS
Rise Time	$T_r$			20		
Turn-Off Delay Time	$T_{d(off)}$			100		
Fall Time	$T_f$			80		
Dynamic characteristics						
Input Capacitance	$C_{iss}$	$V_{GS} = 0V, V_{DS} = 10V, f = 1MHz$		4000	6400	pF
Output Capacitance	$C_{oss}$			780		
Reverse Transfer Capacitance	$C_{rss}$			625		
Drain-Source Diode Characteristics						
Forward On Voltage <sup>2</sup>	$V_{SD}$	$I_S = 10A, V_{GS} = 0V$			1.2	V
Reverse Recovery Time	$t_{rr}$	$I_S = 20A, V_{GS} = 0V, di/dt = 100A/\mu s$		43		nS
Reverse Recovery Charge	$Q_{rr}$			26		nC

### Notes:

1. Pulse width limited by Max. Junction temperature.
2. Pulse test
3. Surface mounted on 1 in<sup>2</sup> 2oz copper pad of FR4 board,  $t < 10\text{sec}$ ; 135 o C/W when mounted on min. copper pad.
4. Maximum current limited by package.

## Typical Characteristics

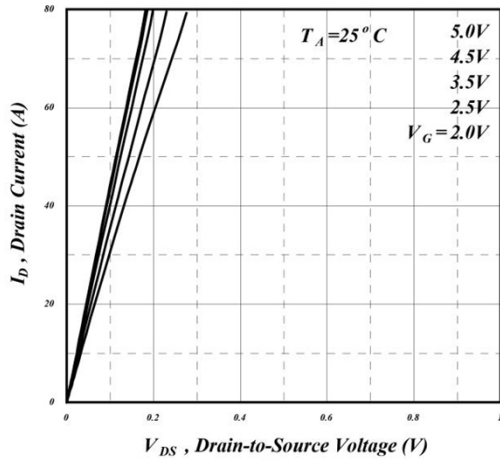


Fig 1. Typical Output Characteristics

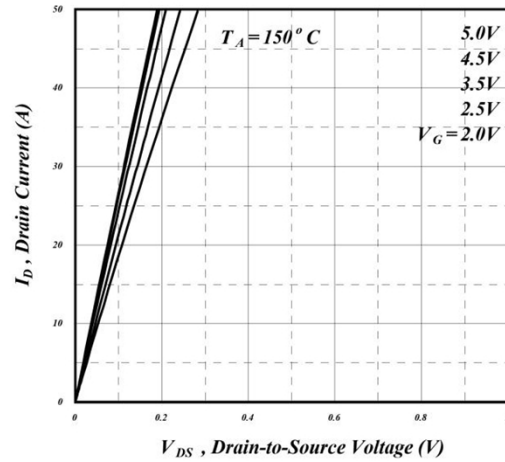


Fig 2. Typical Output Characteristics

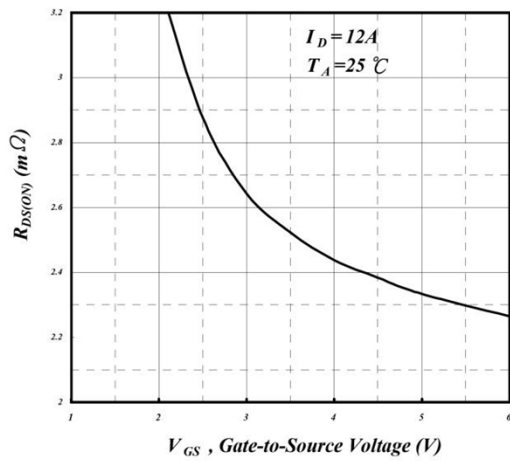


Fig 3. On-Resistance v.s. Gate Voltage

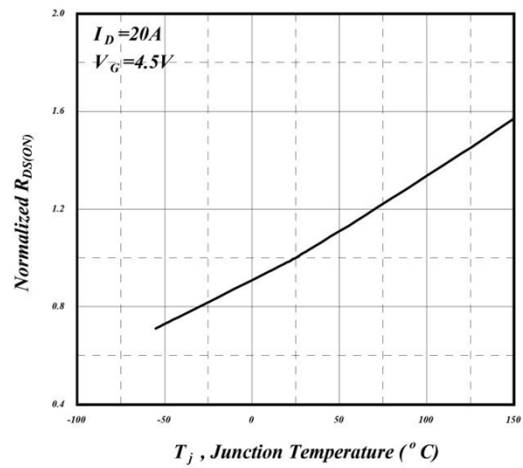


Fig 4. Normalized On-Resistance v.s. Junction Temperature

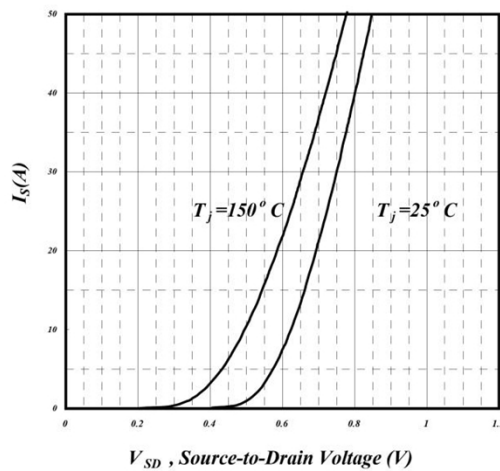


Fig 5. Forward Characteristic of Reverse Diode

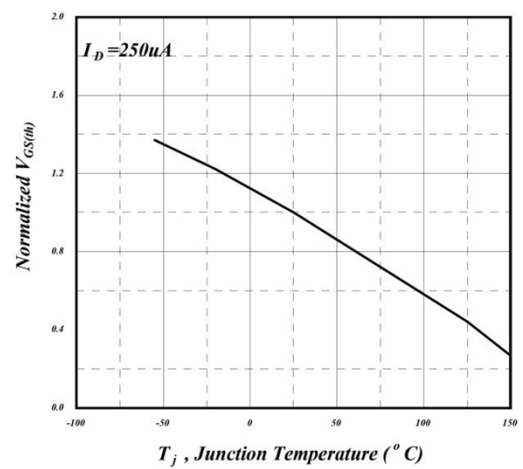


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

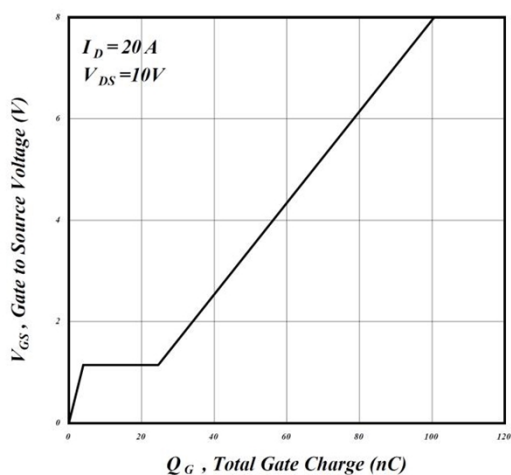


Fig 7. Gate Charge Characteristics

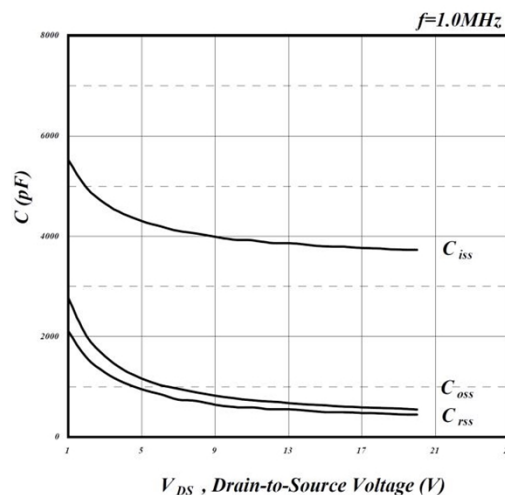


Fig 8. Typical Capacitance Characteristics

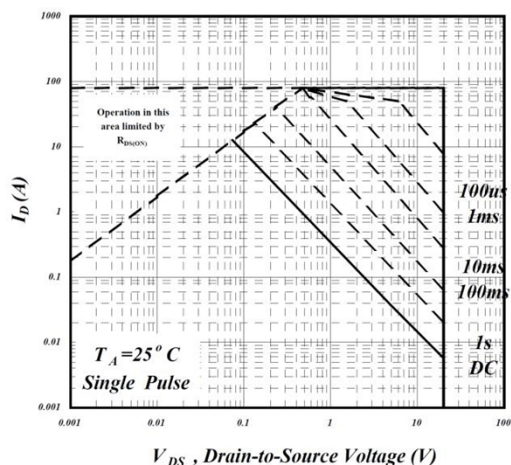


Fig 9. Maximum Safe Operating Area

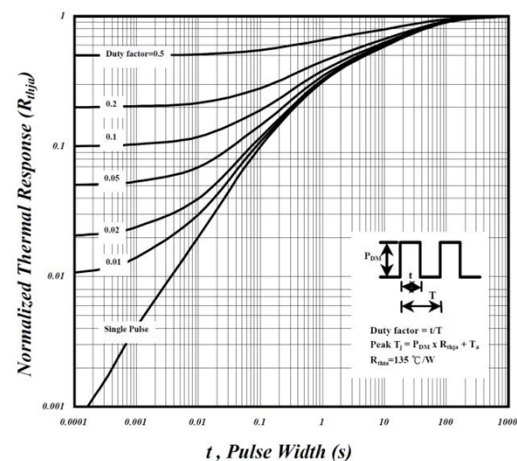


Fig 10. Effective Transient Thermal Impedance

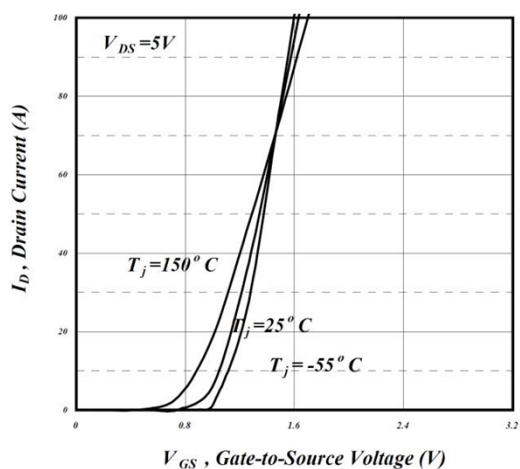


Fig 11. Transfer Characteristics

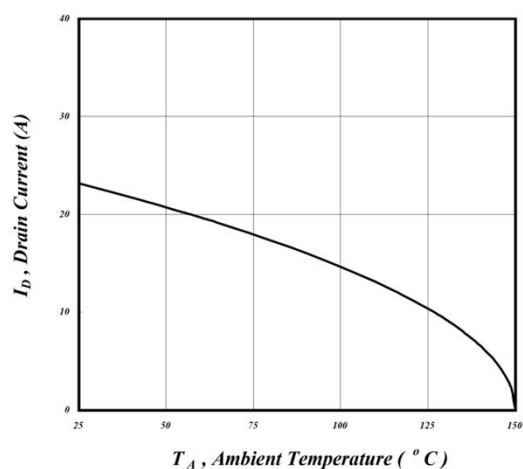
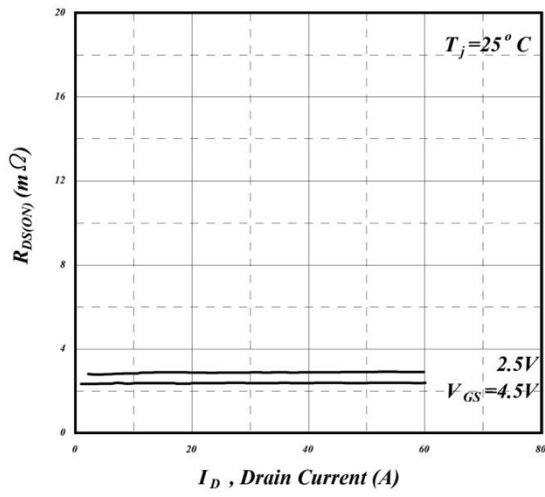
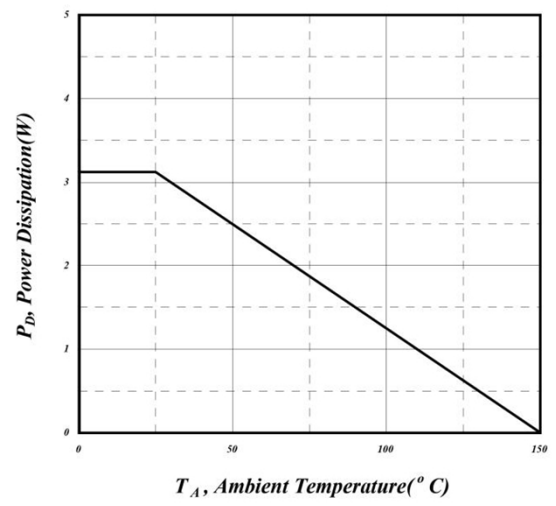


Fig 12. Drain Current v.s. Ambient Temperature

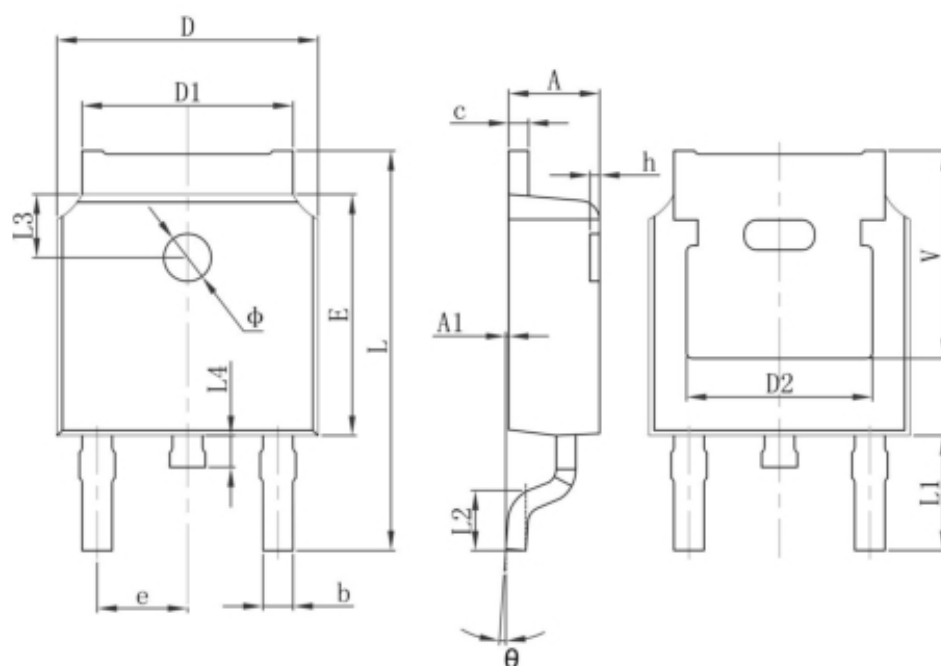


**Fig 13. Typ. Drain-Source on State Resistance**



**Fig 14. Total Power Dissipation**

## 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 REF.		0.190 REF.	
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 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
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 REF.		0.211 REF.	