

## N-Channel Enhancement Mode Field Effect Transistor

### Product Summary

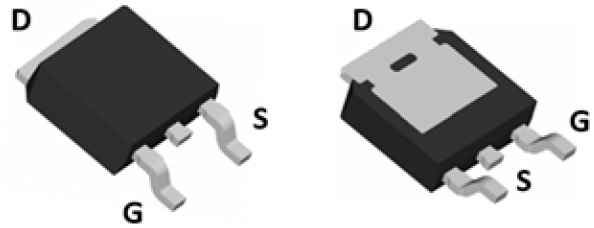
- $V_{DS}$  100V
- $I_D$  50A
- $R_{DS(ON)}$ ( at  $V_{GS}=10V$ ) < 17 mohm
- $R_{DS(ON)}$ ( at  $V_{GS}=4.5V$ ) < 21.5 mohm
- 100% UIS Tested
- 100%  $\nabla V_{DS}$  Tested

### General Description

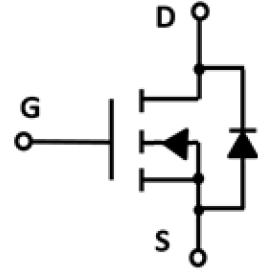
- Low  $R_{DS(on)}$  & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Fast switching and soft recovery

### Applications

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



TO-252



### ■ Absolute Maximum Ratings ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-source Voltage	$V_{DS}$	100	V
Gate-source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current	$I_D$	$T_C=25^\circ\text{C}$	50
		$T_C=100^\circ\text{C}$	28.5
Pulsed Drain Current <sup>A</sup>	$I_{DM}$	180	A
Avalanche energy <sup>B</sup>	EAS	81	mJ
Total Power Dissipation <sup>C</sup>	$P_D$	$T_C=25^\circ\text{C}$	72
		$T_C=100^\circ\text{C}$	28.8
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55~+150	$^\circ\text{C}$

### ■ Thermal resistance

Parameter	Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient <sup>D</sup>	$R_{\theta JA}$	15	20	$^\circ\text{C/W}$
Thermal Resistance Junction-to-Ambient <sup>D</sup>		Steady-State	40	
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	1.35	1.7	

**■ Electrical Characteristics (T<sub>j</sub>=25°C unless otherwise noted)**

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Static Parameter</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA	100			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V			1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> =0V			±100	nA
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA	1	1.8	3	V
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> =20A		14	17	mΩ
		V <sub>GS</sub> = 4.5V, I <sub>D</sub> =20A		17	21.5	mΩ
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =20A, V <sub>GS</sub> =0V			1.3	V
Maximum Body-Diode Continuous Current	I <sub>S</sub>				45	A
Gate resistance	R <sub>G</sub>	f= 1 MHz, Open drain		1		Ω
<b>Dynamic Parameters</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHZ		1135		pF
Output Capacitance	C <sub>oss</sub>			399		
Reverse Transfer Capacitance	C <sub>rss</sub>			18		
<b>Switching Parameters</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =50V, I <sub>D</sub> =25A		16		nC
Gate-Source Charge	Q <sub>gs</sub>			5.6		
Gate-Drain Charge	Q <sub>gd</sub>			2.4		
Reverse Recovery Chrage	Q <sub>rr</sub>	I <sub>F</sub> =20A, di/dt=100A/us		42		
Reverse Recovery Time	t <sub>rr</sub>			39.8		
Turn-on Delay Time	t <sub>D(on)</sub>	V <sub>GS</sub> =10V, V <sub>DD</sub> =50V, I <sub>D</sub> =25A R <sub>GEN</sub> =2.2Ω		39.2		ns
Turn-on Rise Time	t <sub>r</sub>			11		
Turn-off Delay Time	t <sub>D(off)</sub>			53.2		
Turn-off fall Time	t <sub>f</sub>			15.8		

A. Repetitive rating; pulse width limited by max. junction temperature.

B. V<sub>DD</sub>=50V, V<sub>GS</sub>=10V, L=5mH, I<sub>AS</sub>=5.7A.

C. Pd is based on max. junction temperature, using junction-case thermal resistance.

D. The value of RqJA is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with TA =25°C. The Power dissipation PDSM is based on R qJA ≤ 10s and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.

■ Typical Performance Characteristics

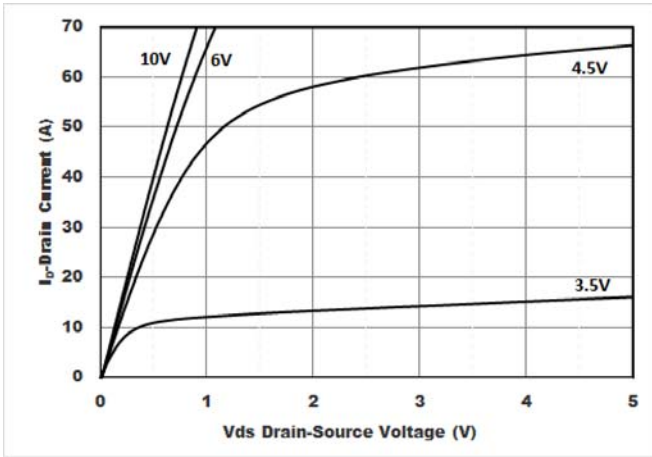


Figure1. Output Characteristics

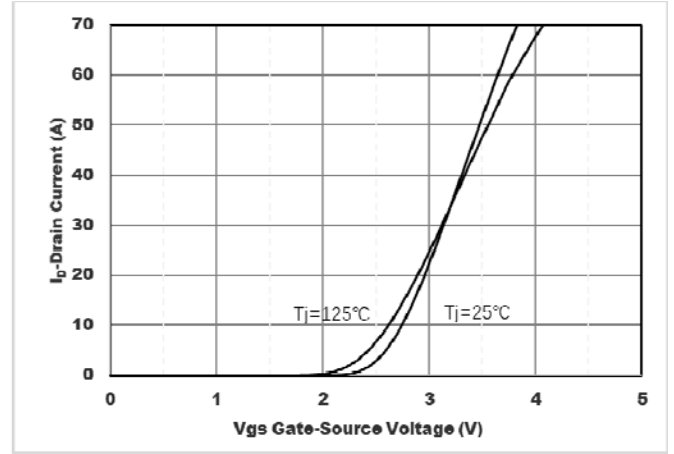


Figure2. Transfer Characteristics

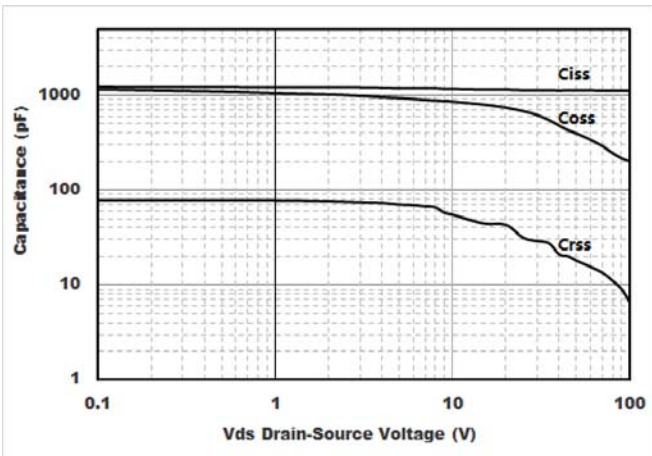


Figure3. Capacitance Characteristics

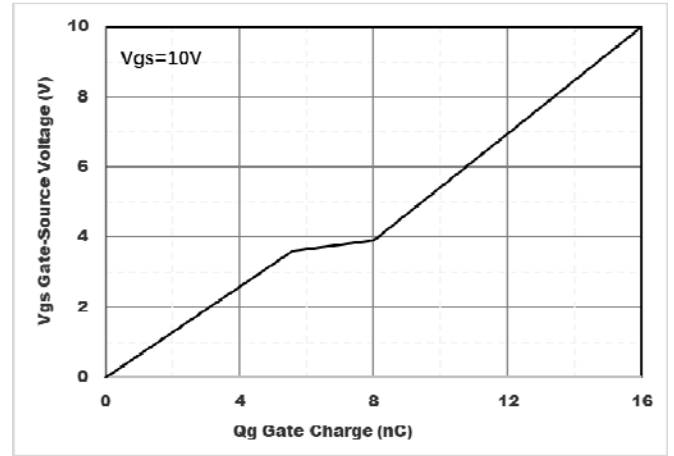


Figure4. Gate Charge

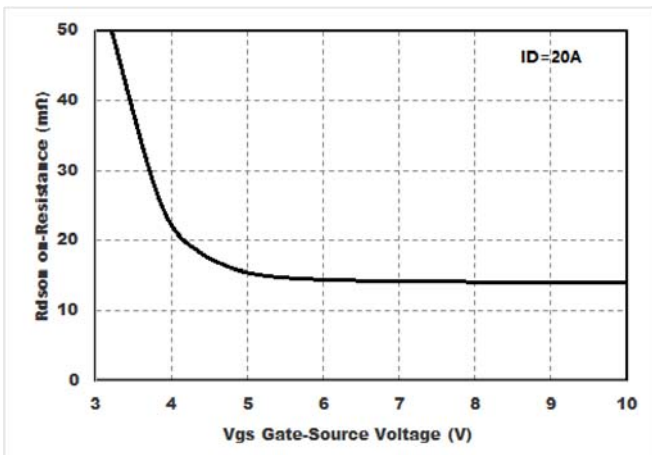


Figure5. : On-Resistance vs. Drain Current and Gate Voltage

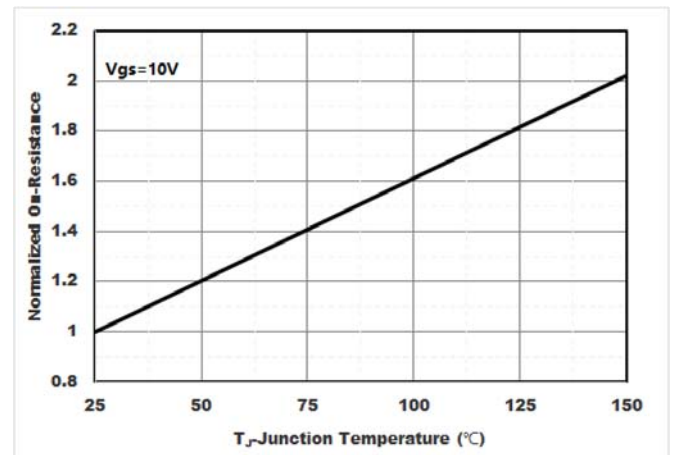


Figure6. Normalized On-Resistance

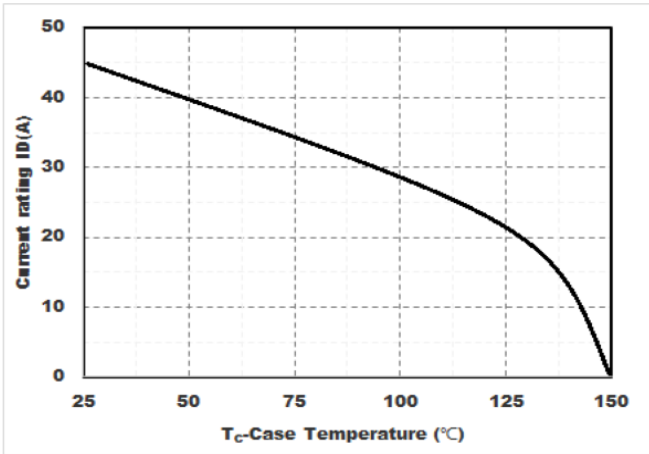


Figure7. Drain current

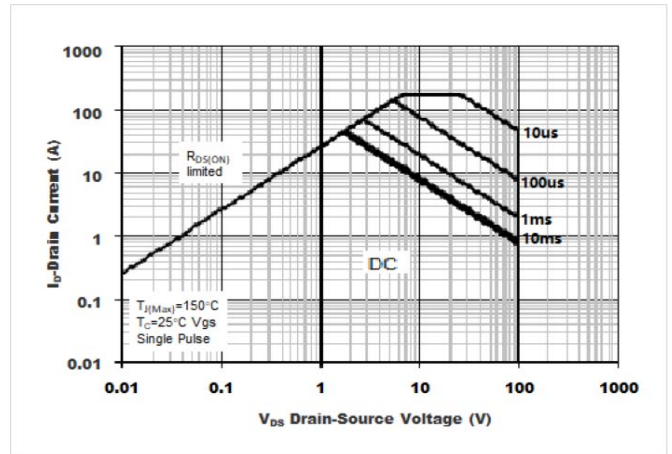


Figure8.Safe Operation Area

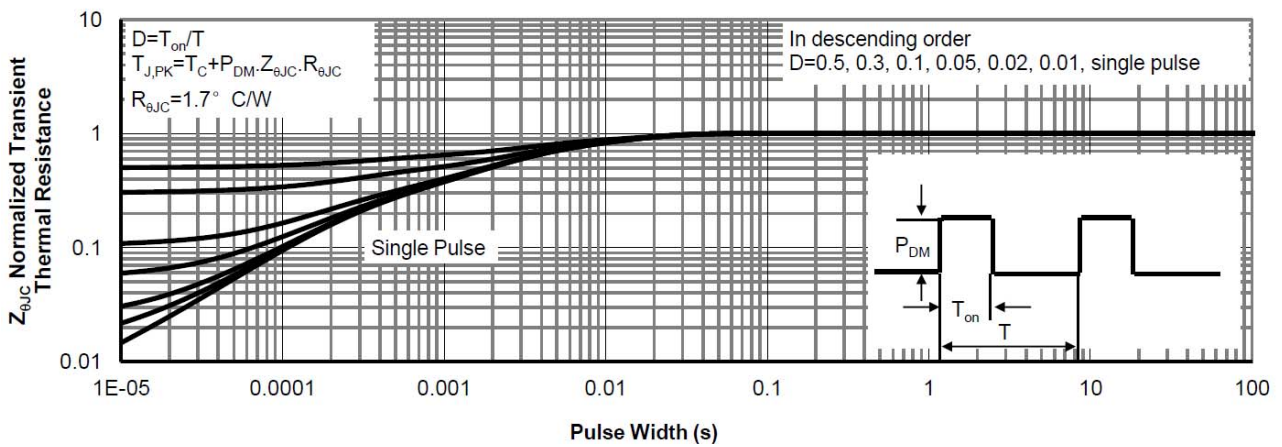
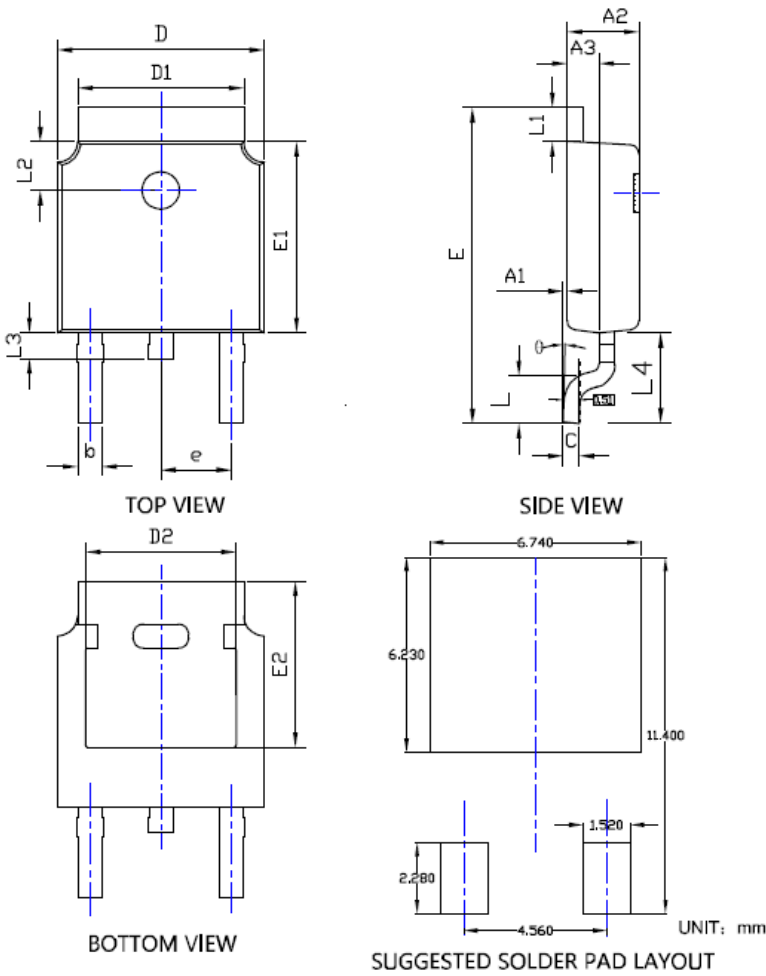


Figure9.Normalized Maximum Transient thermal impedance

■ TO-252 Package information



SYMBOL	DIMENSIONS					
	INCHES			Millimeter		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A1	0.000	---	0.008	0.000	---	0.200
A2	0.087	0.091	0.094	2.200	2.300	2.400
A3	0.035	0.039	0.043	0.900	1.000	1.100
b	0.026	0.030	0.034	0.660	0.760	0.860
c	0.018	0.020	0.023	0.460	0.520	0.580
D	0.256	0.260	0.264	6.500	6.600	6.700
D1	0.203	0.209	0.215	5.150	5.300	5.450
D2	0.181	0.189	0.195	4.600	4.800	4.950
E	0.390	0.398	0.406	9.900	10.100	10.300
E1	0.236	0.240	0.244	6.000	6.100	6.200
E2	0.203	0.209	0.215	5.150	5.300	5.450
e	0.090BSC			2.286BSC		
L	0.049	0.059	0.069	1.250	1.500	1.750
L1	0.035	---	0.050	0.900	---	1.270
L2	0.055	---	0.075	1.400	---	1.900
L3	0.240	0.310	0.039	0.600	0.800	1.000
L4	0.114REF			2.900REF		
θ	0°	---	10°	0°	---	10°