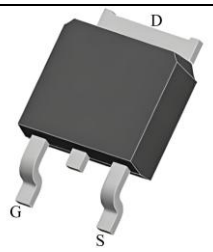
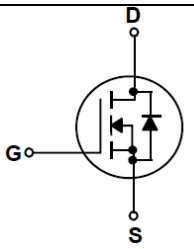
MSE004D

N-Channel Enhancement Mode MOSFET

Features

- ◆ 150V, 54A, $R_{DS(on)}$(Typ.) = 16mΩ@V_{GS} = 10V
- ◆ Reliable and Rugged
- ◆ Fast Switching Speed
- ◆ 100% E_{AS} Guaranteed
- ◆ Green Device Available

TOP View (TO-252)	Symbol
	

Application

- ◆ DC/DC Converter
- ◆ High Frequency Switching and Synchronous

Absolute Maximum Ratings T_c = 25°C unless otherwise noted

Symbol	Parameter		Rating	Unit
V_{DS}	Drain-Source Voltage [a]		150	V
V_{GS}	Gate-Source Voltage		±20	
I_D	Drain Current-Continuous	T_C = 25°C	54	A
		T_C = 100°C	34	
I_{DM}	Drain Current-Pulsed [b]		215	
P_D	Maximum Power Dissipation, T_C = 25°C		125	W
E_{AS}	Single Pulsed Avalanche Energy [c]		225	mJ
T_J, T_{STG}	Operating and Store Temperature Range		150, -55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	45	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	1.0	

Electrical Characteristics T_J = 25°C unless otherwise noted

■ **Off Characteristics**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	150	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 150V, V_{GS} = 0V	-	-	1.0	μA
I_{GSS}	Forward Gate Body Leakage Current	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	2.0	-	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance [d]	V_{GS} = 10V, I_D = 20A	-	16	20	mΩ

■ Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
R_G	Gate Resistance	V_{DS} = V_{GS} = 0V, f = 1.0MHz	-	0.7	-	Ω
C_{iss}	Input Capacitance	V_{DS} = 75V, V_{GS} = 0V, f = 1.0MHz	-	2291	-	pF
C_{oss}	Output Capacitance		-	209	-	
C_{rss}	Reverse Transfer Capacitance		-	18	-	

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	V_{DS} = 75V, V_{GS} = 10V, I_D = 20A, R_{GEN} = 3.0Ω	-	15.3	-	ns
t_r	Turn-On Rise Time		-	18.8	-	
$t_{d(off)}$	Turn-Off Delay Time		-	22	-	
t_f	Turn-Off Fall Time		-	5.1	-	
Q_g	Total Gate Charge	V_{DS} = 75V, V_{GS} = 0 to 10V, I_D = 20A	-	32	-	nC
Q_{gs}	Gate-Source Charge		-	13	-	
Q_{gd}	Gate-Drain Charge		-	6.1	-	

■ Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_S	Drain-Source Diode Forward Continuous Current	V_G = V_D = 0V, Force Current	-	-	54	A
I_{SM}	Maximum Pulsed Current		-	-	215	
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0V, I_S = 20A	-	-	1.2	V
T_{rr}	Body Diode Reverse Recovery Time	I_F = 20A, dI_F/dt = 100A/μs	-	48	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F = 20A, dI_F/dt = 100A/μs	-	66	-	nC

Notes:

a. T_J = +25 ℃ to +150 ℃.

b. Repetitive rating: pulse width limited by maximum junction temperature.

c. L = 0.5mH, V_{DD} = 50V, I_{AS} = 30A, R_G = 25Ω Starting T_J = 25 ℃.

d. Pulse width ≦ 300μs; duty cycle ≦ 2%.

■ Characteristic Curve

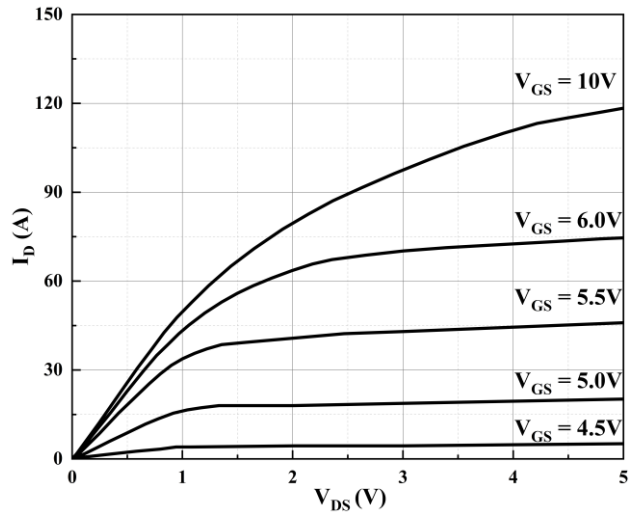


Figure 1. Typical Output Characteristics

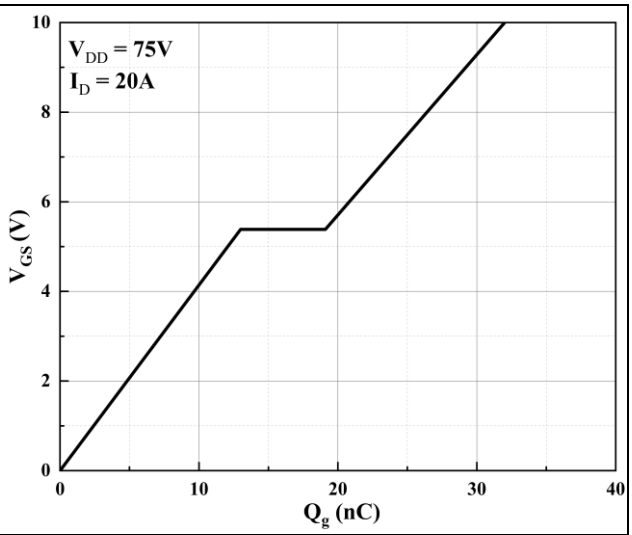


Figure 2. Typical Gate Charge

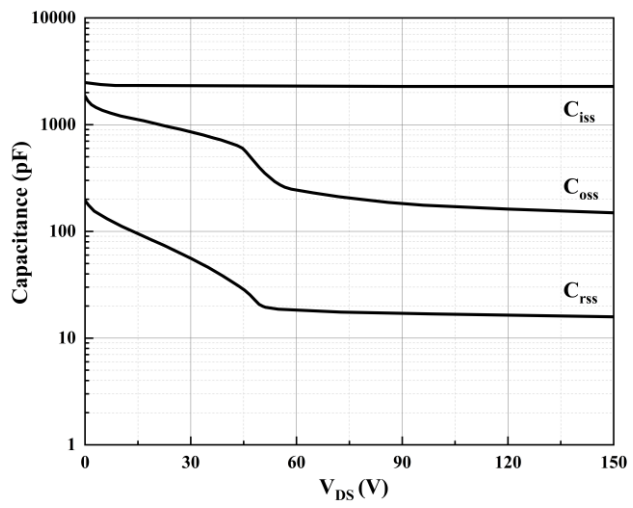


Figure 3. Static Drain-Source On-Resistance vs. Drain Current

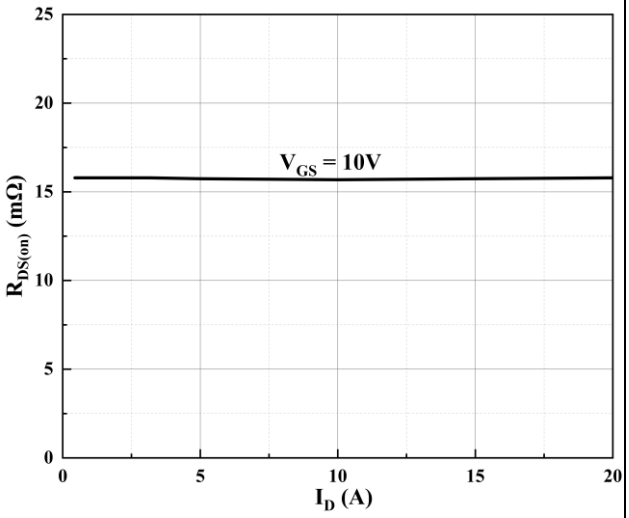


Figure 4. Static Drain-Source On-Resistance vs. Drain Current

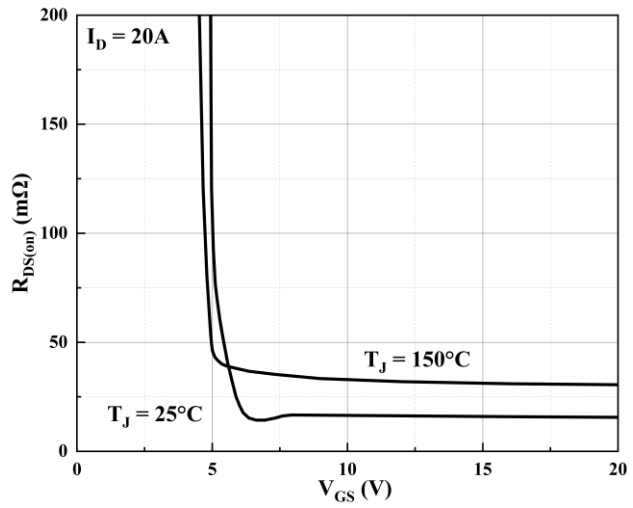


Figure 5. Static Drain-Source On-Resistance vs. Gate-Source Voltage

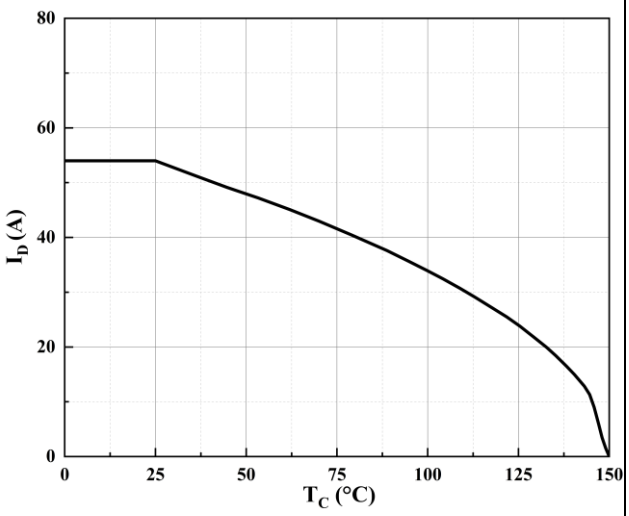


Figure 6. Continuous Drain Current vs. Case Temperature

■ Characteristic Curve

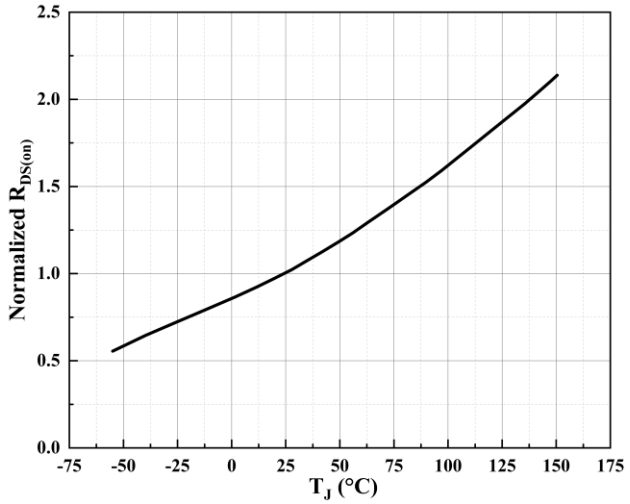


Figure 7. Normalized Static Drain-Source On-Resistance vs. Junction Temperature

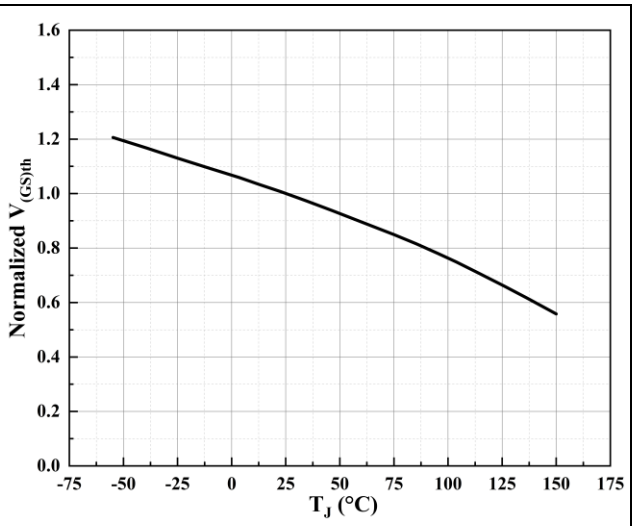


Figure 8. Normalized Threshold Voltage vs. Junction Temperature

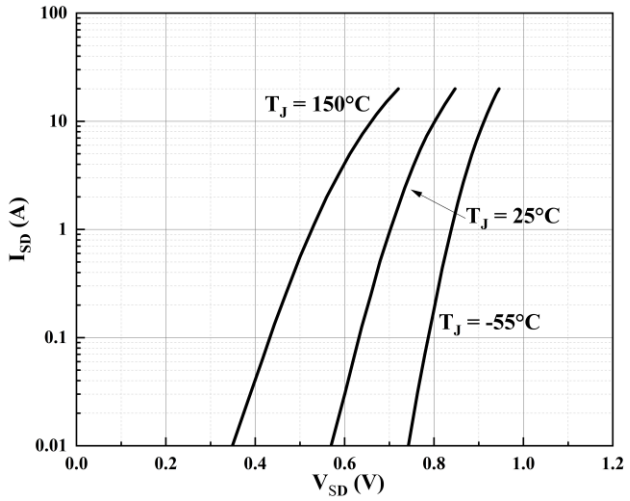


Figure 9. Body Diode Characteristics

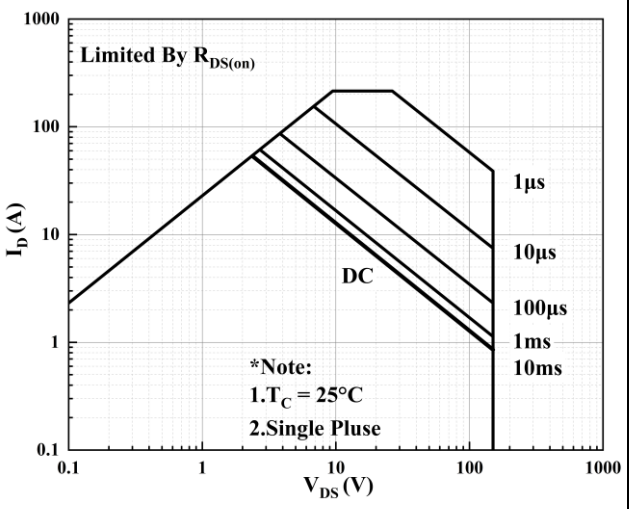


Figure 10. Maximum Safe Operating Area

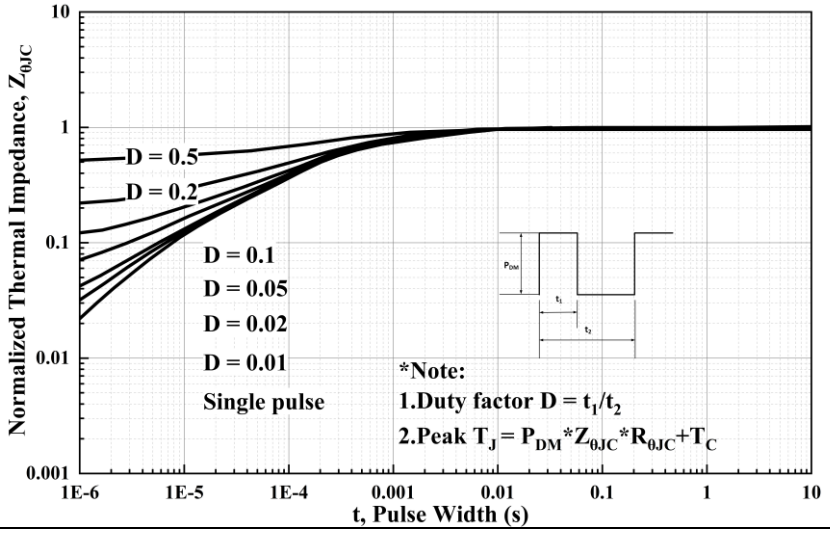


Figure 11. Normalized Maximum Transient Thermal Impedance

■ **Package Information**

TO-252