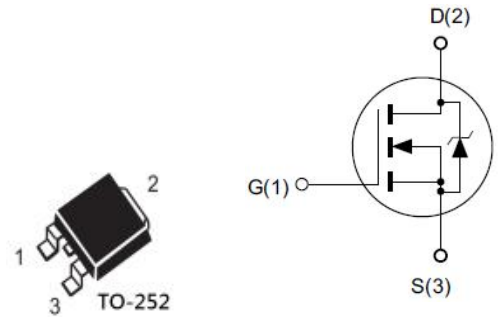


Features

- ◆ 650V, 11A, $R_{DS(ON)}(Typ.) = 0.32\Omega @ V_{GS} = 10V$
- ◆ Advanced Super Junction Technology
- ◆ Easy To Control Gate Switching
- ◆ Enhancement Mode: $V_{GS(th)} = 2.8$ to $4.2 V$

Application

- ◆ Resonant Switching PWM
- ◆ PFC Stages, Hard Switching PWM Stages
- ◆ PC, Silver box, Adaptor, LCD & PDP TV and Lighting
- ◆ Server Power, Telecom Power and UPS Application



Absolute Maximum Ratings $T_c = 25^\circ C$ unless otherwise noted

Symbol	Parameter	Rating	Unit
V_{DS}	Drain-Source Voltage ^a	650	V
V_{GS}	Gate-Source Voltage	± 30	
I_D	Drain Current-Continuous, $T_c = 25^\circ C$	11	A
I_{DM}	Drain Current-Pulsed ^b	33	
P_D	Maximum Power Dissipation @ $T_J = 25^\circ C$	83	W
dv/dt	Peak Diode Recovery dv/dt ^c	15	V/ns
E_{AS}	Single Pulsed Avalanche Energy ^d	624	mJ
T_J, T_{STG}	Operating and Store Temperature Range	150, -55 to 150	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.5	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62	$^\circ C/W$

Electrical Characteristics $T_J = 25^\circ C$ unless otherwise noted

■ Off Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	650	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 650V, V_{GS} = 0V$	-	-	1	μA
I_{GSS}	Forward Gate Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 30V$	-	-	± 100	nA

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.8	-	4.2	V
$R_{DS(on)}$	Static Drain-Source On-Resistance ^c	$V_{GS} = 10V, I_D = 5.5A$	-	0.32	0.35	Ω

■ Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
R_G	Gate Resistance	$f = 1.0MHz$	-	11	-	Ω
C_{iss}	Input Capacitance	$V_{DS} = 50V,$ $V_{GS} = 0V,$ $f = 10kHz$	-	901	-	pF
C_{oss}	Output Capacitance		-	59	-	
C_{rss}	Reverse Transfer Capacitance		-	5.3	-	

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 400V,$ $I_D = 4.8A,$ $V_{GS} = 13V,$ $R_G = 3.4\Omega$	-	7.2	-	ns
t_r	Turn-On Rise Time		-	20.8	-	
$t_{d(off)}$	Turn-Off Delay Time		-	29.2	-	
t_f	Turn-Off Fall Time		-	19.2	-	
Q_g	Total Gate Charge	$V_{DS} = 400V,$ $I_D = 4.8A,$ $V_{GS} = 0 \text{ to } 10V$	-	22	-	nC
Q_{gs}	Gate-Source Charge		-	5.8	-	
Q_{gd}	Gate-Drain Charge		-	17	-	

■ Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_F = 1A$	-	0.74	-	V
T_{rr}	Body Diode Reverse Recovery Time	$I_F = 4.8A, V_R = 400V$ $dI_F/dt = 100A/\mu s$	-	250	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F = 4.8A, V_R = 400V$ $dI_F/dt = 100A/\mu s$	-	2.57	-	μC
I_{rrm}	Peak reverse recovery current	$I_F = 4.8A, V_R = 400V$ $dI_F/dt = 100A/\mu s$	-	19.6	-	A

Notes:

- $T_J = +25^\circ C$ to $+150^\circ C$
- Repetitive rating; pulse width limited by maximum junction temperature.
- Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$
- $L = 49.9mH, V_{DD} = 50V, I_{AS} = 5A, R_G = 25\Omega$ Starting $T_J = 25^\circ C$.

■ Characteristic Curve

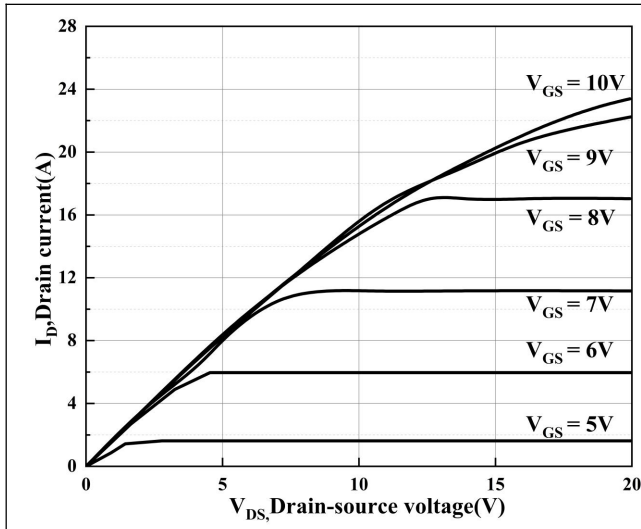


Figure 1. Typical Output Characteristics

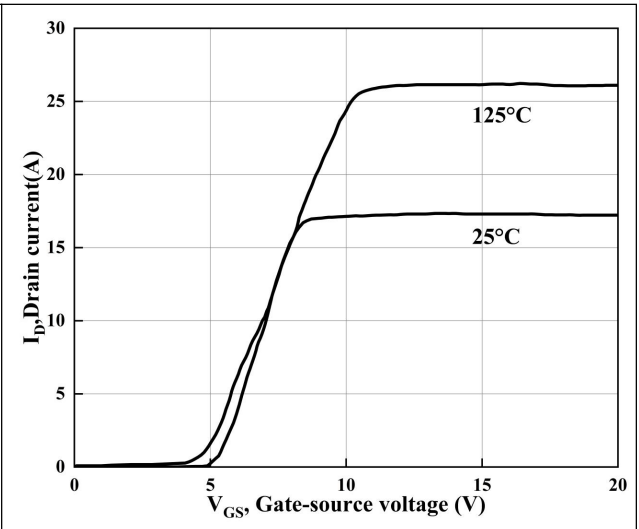


Figure 2. Typical Transfer Characteristics

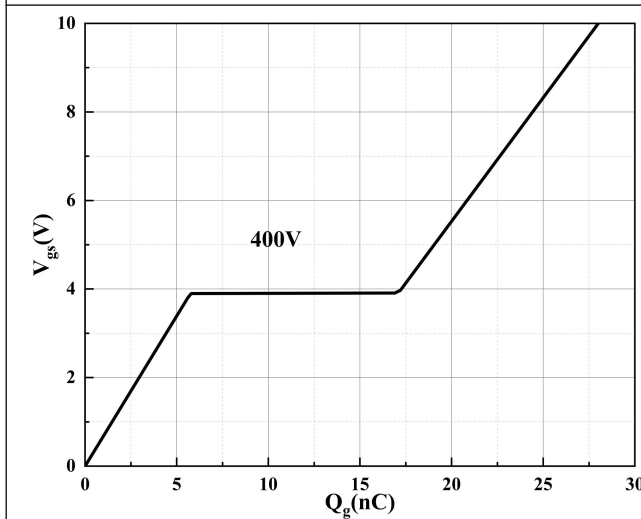


Figure 3. Typical Gate Charge

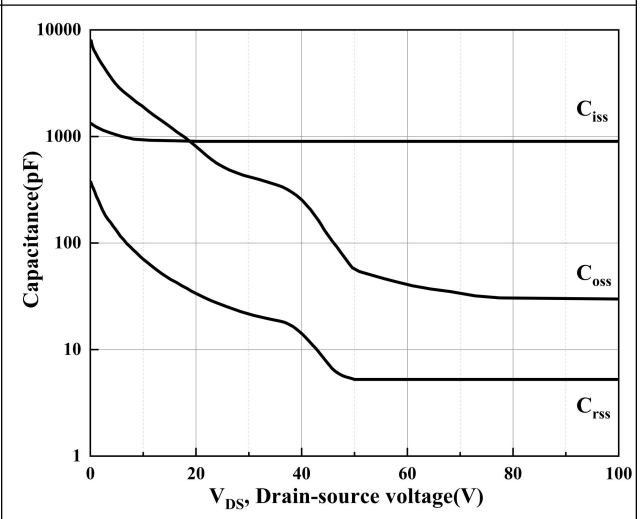


Figure 4. Typical Capacitance

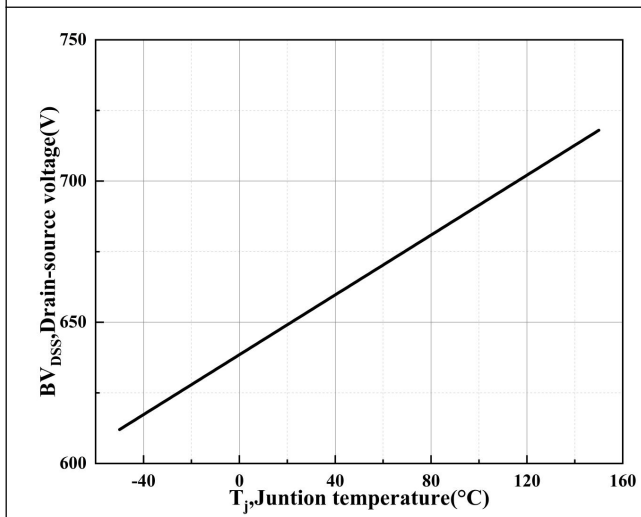


Figure 5. Drain-source Breakdown Voltage

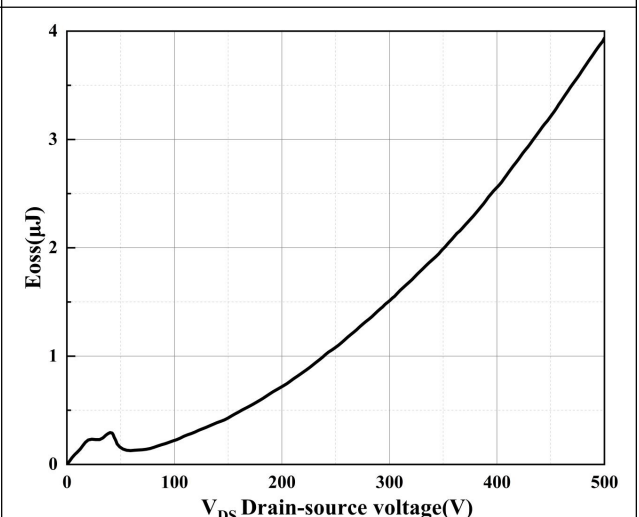
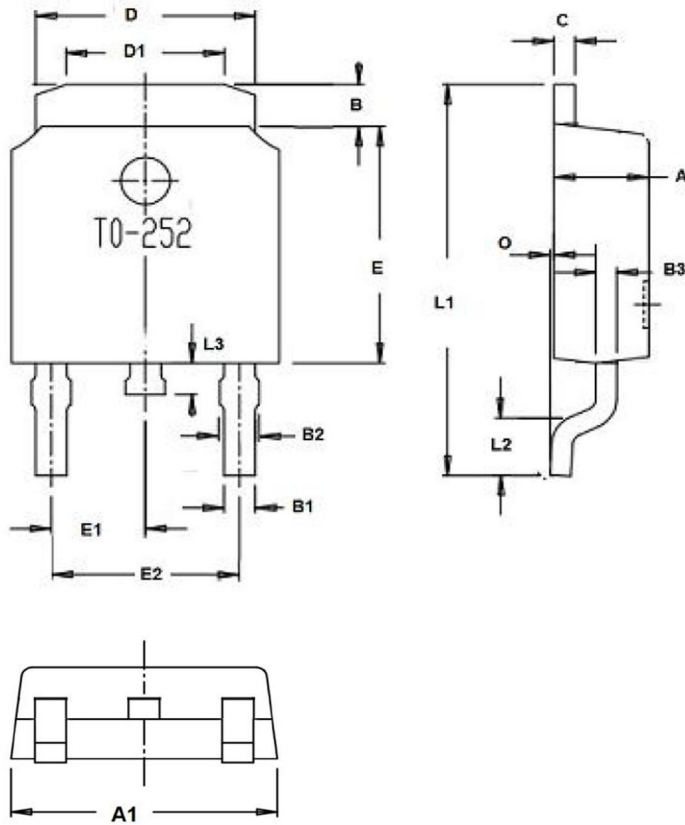


Figure 6. Typical C_{oss} Stored Energy

■ Package Information

TO-252



Dim.	Min.	Max.
A	2.1	2.5
A1	6.3	6.9
B	0.96	1.42
B1	0.74	0.86
B2	0.74	0.94
C	Typ0.5	
D	5.33	5.53
D1	3.65	4.05
E	6.0	6.2
E1	Typ2.29	
E2	Typ4.58	
O	0	0.15
L1	9.9	10.5
L2	Typ1.65	
L3	0.6	1.0
All Dimensions in millimeter		