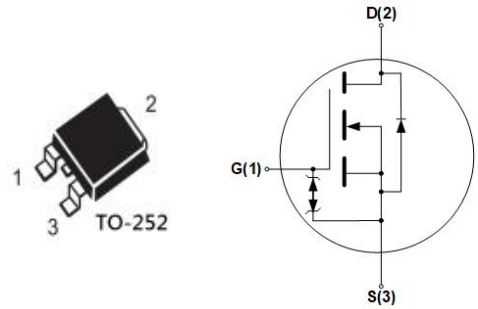


Features

- ◆ 650V, 20A, $R_{DS(on)}(Typ.) = 160m\Omega @ V_{GS} = 10V$
- ◆ Advanced Super Junction Gen-III Technology
- ◆ Easy To Control Gate Switching
- ◆ 100% Avalanche Tested



Application

- ◆ PC power and PD Adaptor
- ◆ LCD & PDP TV and LED lighting
- ◆ Single-ended flyback or two-transistor forward topologies

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	$T_C = 25^\circ C$	20	A
		$T_C = 100^\circ C$	12.6	
I_{DM}	Drain Current-Pulsed ^b		65	
P_D	Power Dissipation, $T_C = 25^\circ C$		147	W
dv/dt	Peak Diode Recovery dv/dt		15	V/ns
E_{AS}	Single Pulsed Avalanche Energy ^c		375	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	0.85	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62	

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	$V_{DS} = 650, V_{GS} = 0V$	-	-	1.0	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	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.5	3.5	4.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance ^d	$V_{GS} = 10V, I_D = 10A$	-	160	190	m Ω

■ Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
R_G	Gate Resistance	$f = 1.0MHz$	-	20	-	Ω
C_{iss}	Input Capacitance	$V_{DS} = 50V,$ $V_{GS} = 0V,$ $f = 1.0MHz$	-	1418	-	pF
C_{oss}	Output Capacitance		-	50	-	
C_{rss}	Reverse Transfer Capacitance		-	1.2	-	

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{DS} = 400V,$ $V_{GS} = 10V,$ $I_D = 10A,$ $R_G = 10\Omega$	-	15	-	ns
t_r	Turn-On Rise Time		-	14	-	
$t_{d(off)}$	Turn-Off Delay Time		-	72	-	
t_f	Turn-Off Fall Time		-	10	-	
Q_g	Total Gate Charge	$V_{DS} = 400V,$ $V_{GS} = 0 \text{ to } 10V,$ $I_D = 10A$	-	29	-	nC
Q_{gs}	Gate-Source Charge		-	7.6	-	
Q_{gd}	Gate-Drain Charge		-	9.7	-	

■ Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_S = 20A$	-	0.9	-	V
T_{rr}	Body Diode Reverse Recovery Time	$V_{DS} = 400V, I_S = 10A$ $di_F/dt = 100A/\mu s$	-	280	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge		-	3.5	-	μC
I_{rrm}	Peak reverse recovery current		-	23	-	A

Notes:

- $T_J = +25^\circ C$ to $+150^\circ C$.
- Repetitive rating: pulse width limited by maximum junction temperature.
- $L = 30mH, V_{DD} = 50V, I_{AS} = 5A, R_G = 25\Omega$ Starting $T_J = 25^\circ C$.
- Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

■ Characteristic Curve

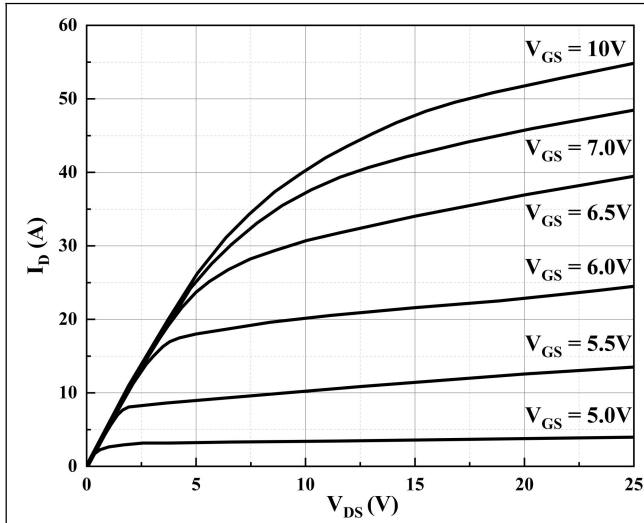


Figure 1. Typical Output Characteristics

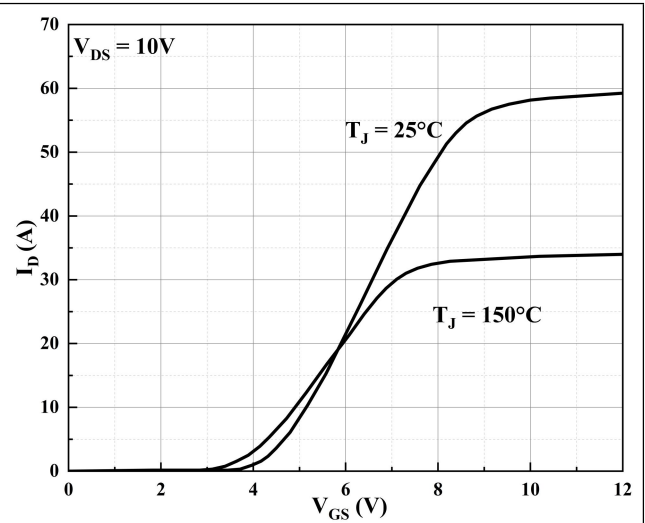


Figure 2. Typical Transfer Characteristics

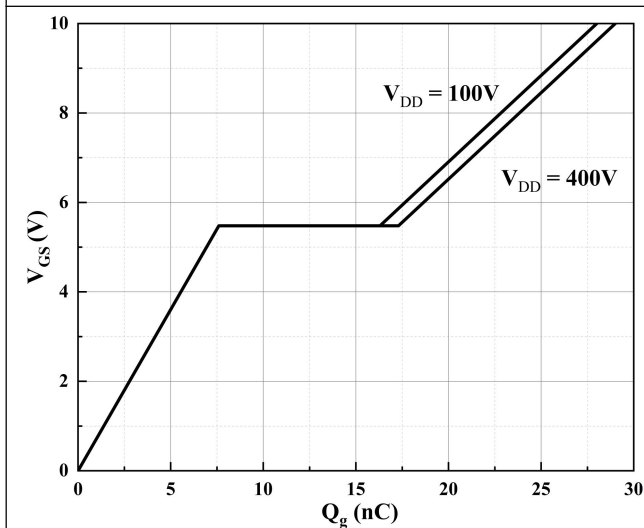


Figure 3. Typical Gate Charge

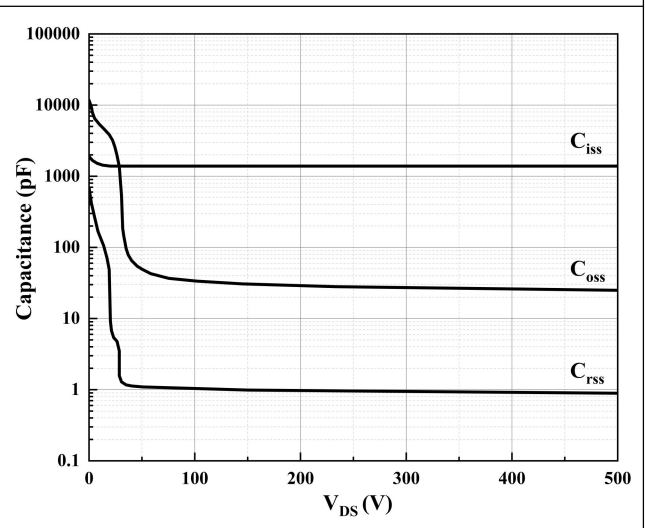


Figure 4. Typical Capacitance Characteristics

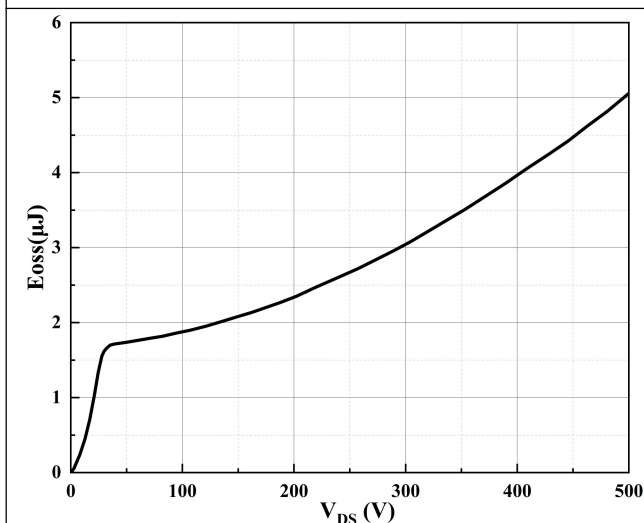


Figure 5. Typical Coss Stored Energy

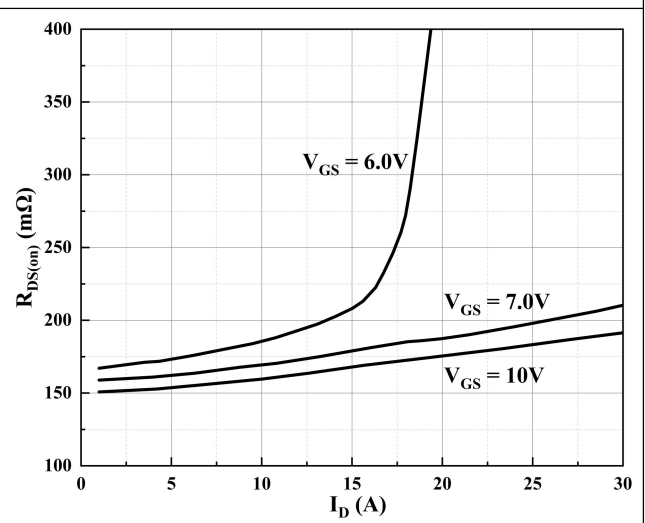


Figure 6. Static Drain-Source On-Resistance vs. Drain Current

■ Characteristic Curve

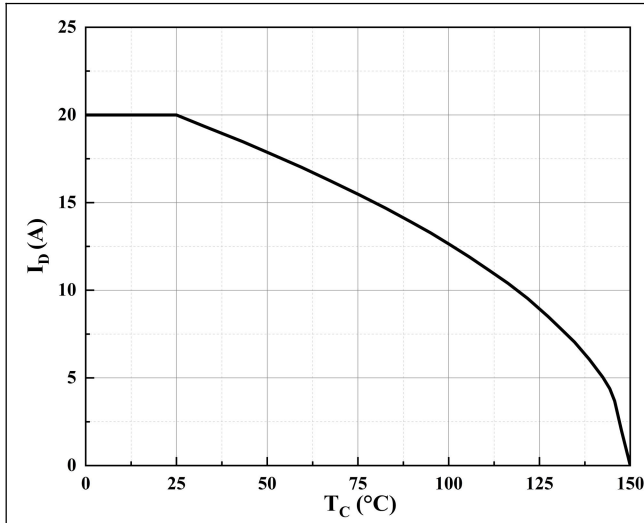


Figure 7. Continuous Drain Current vs. Case Temperature

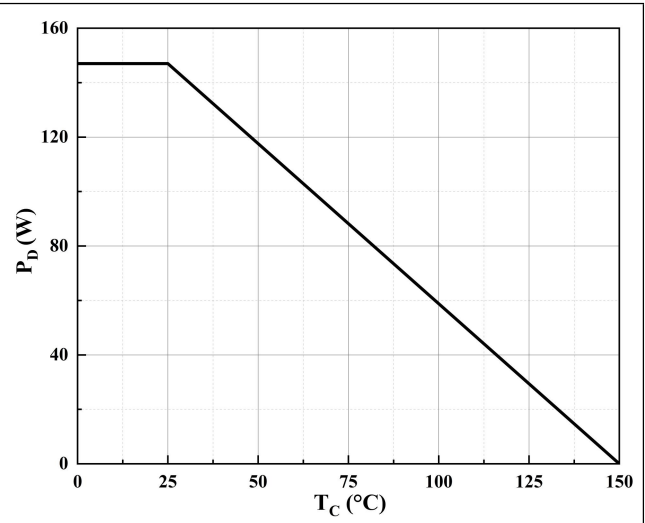


Figure 8. Power Dissipation vs. Case Temperature

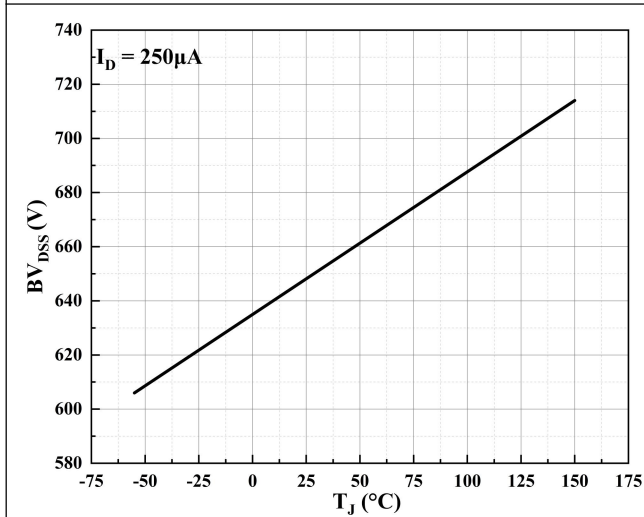


Figure 9. Drain-Source Breakdown Voltage vs. Junction Temperature

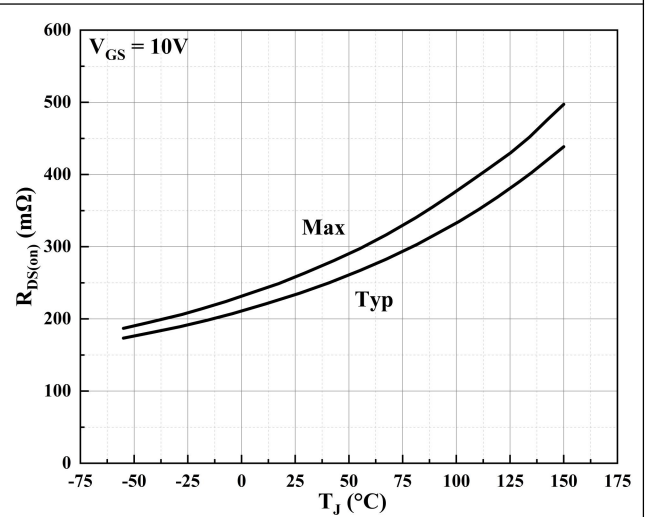


Figure 10. Static Drain-Source On-Resistance vs. Junction Temperature

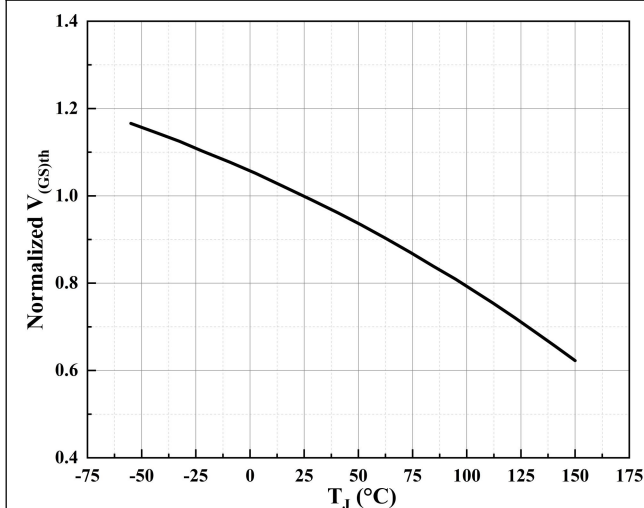


Figure 11. Normalized Threshold Voltage vs. Junction Temperature

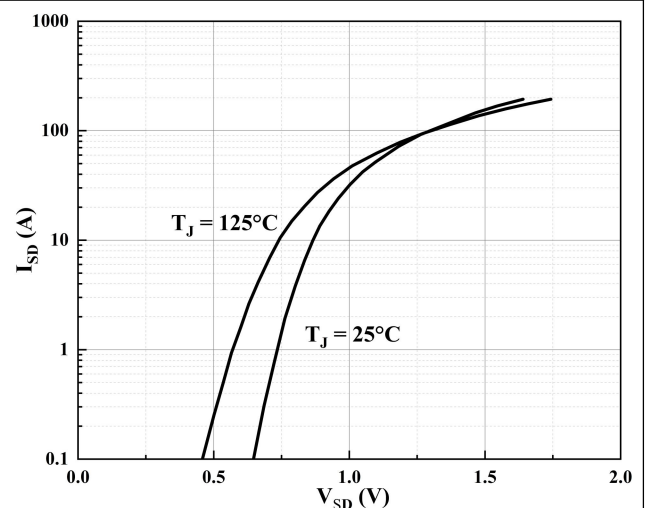
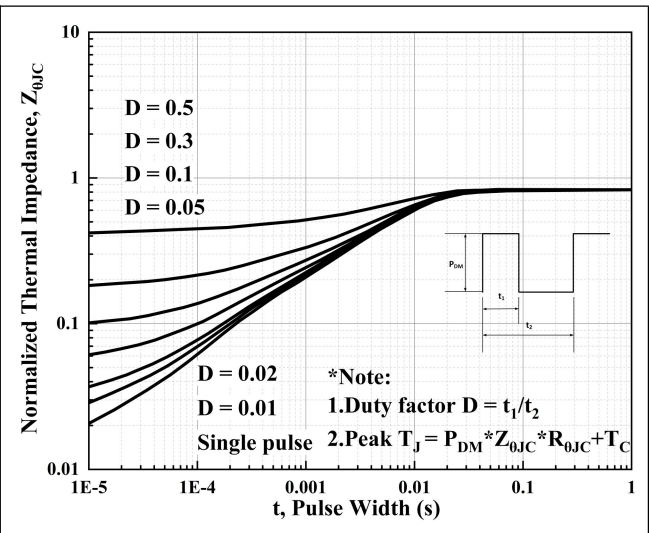
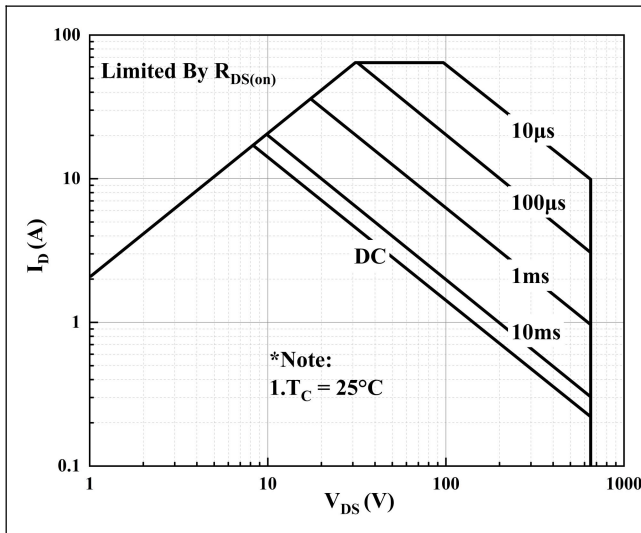


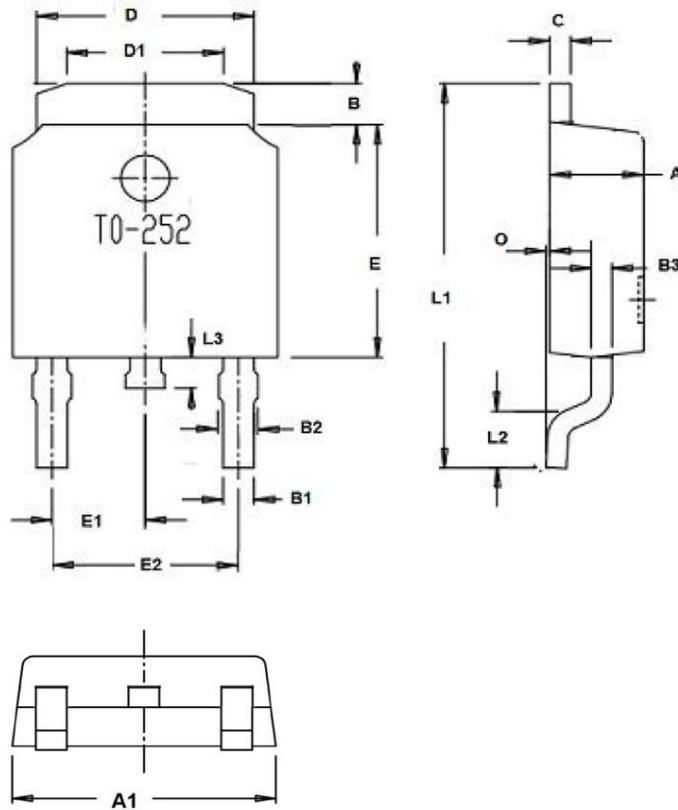
Figure 12. Body Diode Characteristics

■ Characteristic Curve



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		