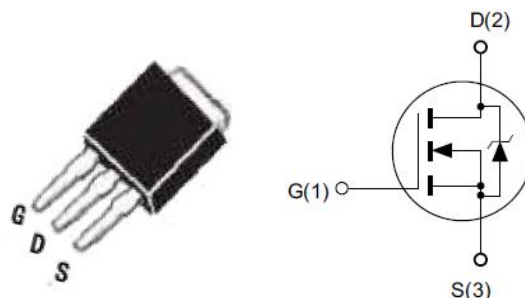


Features

- ◆ 650V, 4A, $R_{DS(ON)}(Typ.) = 2.3\Omega @ V_{GS} = 10V$.
- ◆ Low C_{rss}
- ◆ Fast Switching
- ◆ 100% Avalanche Tested

Application

- ◆ Charger
- ◆ Standby Power



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

Symbol	Parameter	Limit	Unit
		TO-251	
V_{DS}	Drain-Source Voltage ^a	650	V
V_{GS}	Gate-Source Voltage	± 30	V
I_D	Drain Current-Continuous, $T_C = 25^\circ\text{C}$	4	A
	Drain Current-Continuous, $T_C = 100^\circ\text{C}$	2.5	A
I_{DM}	Drain Current-Pulsed ^b	16	A
P_D	Maximum Power Dissipation @ $T_J = 25^\circ\text{C}$	77	W
dv/dt	Peak Diode Recovery dv/dt ^c	5.0	V/ns
E_{AS}	Single Pulsed Avalanche Energy ^d	180	mJ
T_J, T_{STG}	Operating and Store Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-Case Max.	1.62	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient Max	110	$^\circ\text{C/W}$

Electrical Characteristics $T_J = 25^\circ\text{C}$ 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	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	-	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10V, I_D = 2A$	-	2.3	2.7	Ω

■ Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Ciss	Input Capacitance	$V_{DS} = 25V,$ $V_{GS} = 0V,$ $f = 1.0MHz$	-	610	-	pF
Coss	Output Capacitance		-	53	-	pF
Crss	Reverse Transfer Capacitance		-	3.5	-	pF

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 325V, I_D = 4A,$ $R_G = 25\Omega, V_{GS} = 10V$	-	12.7	-	ns
t_r	Turn-On Rise Time		-	17.4	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	30.9	-	ns
t_f	Turn-Off Fall Time		-	10.5	-	ns
Qg	Total Gate Charge	$V_{DS} = 520V, I_D = 4A,$ $V_{GS} = 10V$	-	14.2	-	nC
Qgs	Gate-Source Charge		-	5.5	-	nC
Qgd	Gate-Drain Charge		-	3.8	-	nC

■ Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_S	Drain-Source Diode Forward Continuous Current	$V_{GS} = 0V$	-	-	4	A
I_{SM}	Maximum Pulsed Current	$V_{GS} = 0V$	-	-	16	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_S = 4A$	-	-	1.4	V
T_{rr}	Body Diode Reverse Recovery Time	$di/dt = 100A/\mu s$ $I_F = 4A, V_{GS} = 0V$	-	264	-	ns
Q_{rr}	Reverse Recovery Charge		-	1200	-	nC

Notes:

- $T_J = +25^\circ C$ to $+150^\circ C$
- Repetitive rating; pulse width limited by maximum junction temperature.
- $I_{SD} = 4A, di/dt \leq 100A/\mu s, V_{DD} \leq BV_{DS},$ Start $T_J = 25^\circ C$
- $L = 10mH, V_{DD} = 50V, I_D = 6A, R_G = 25\Omega$ Starting $T_J = 25^\circ C$

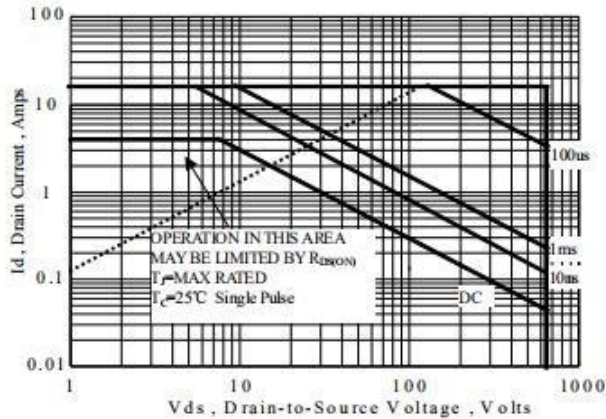


Figure 1 Maximum Safe Operating Area

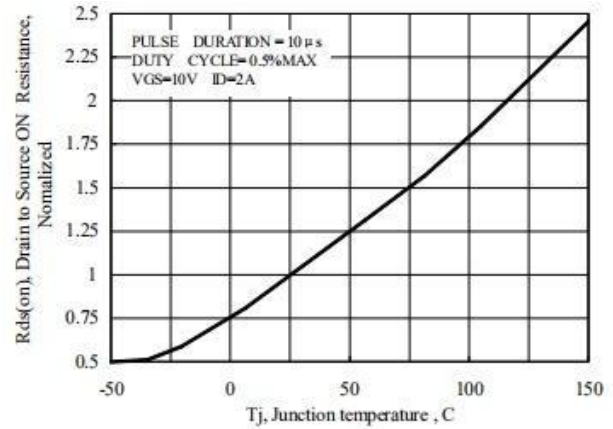


Figure 2. Normalized On-Resistance Variation with Temperature

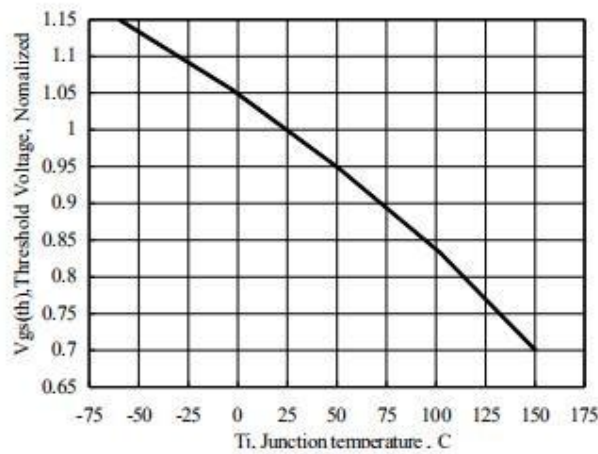


Figure 3. Typical Threshold Voltage vs Junction Temperature

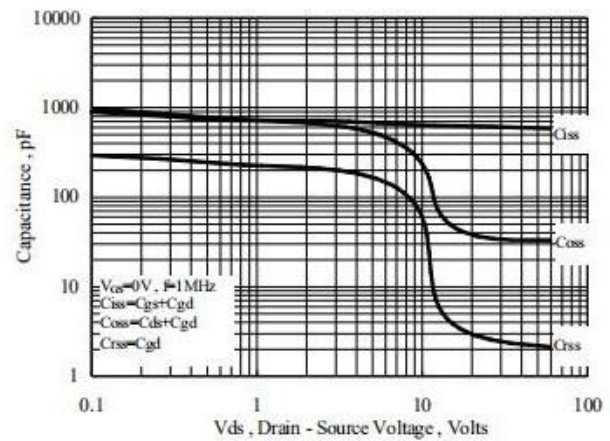


Figure 4. Capacitance Characteristics

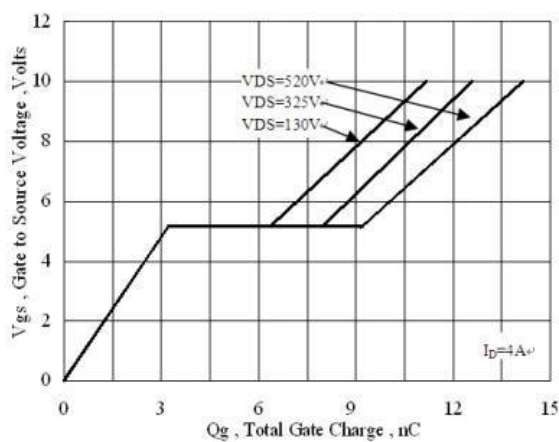


Figure 5. Gate Charge Characteristics

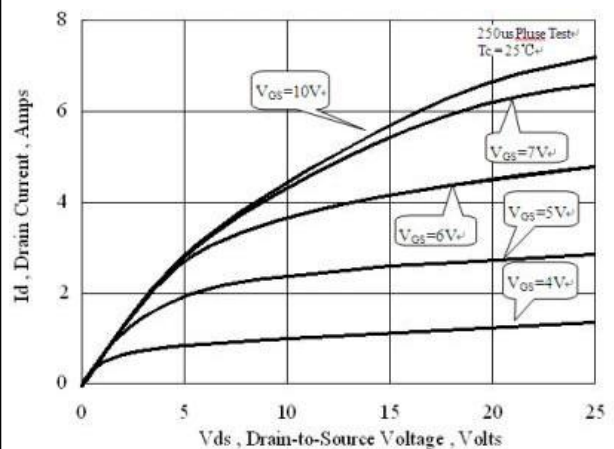


Figure 6. On-State Characteristics

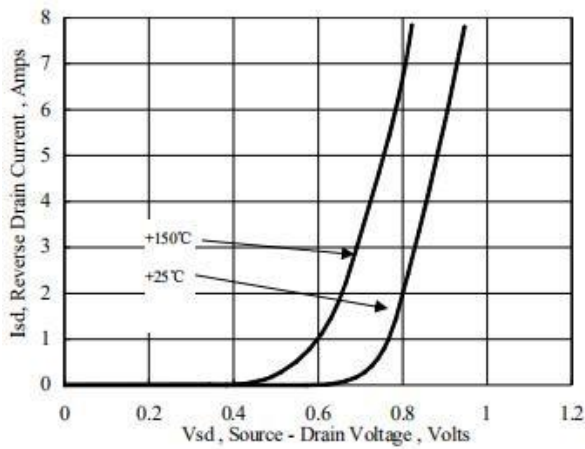


Figure 7. Typical Body Diode Transfer Characteristics

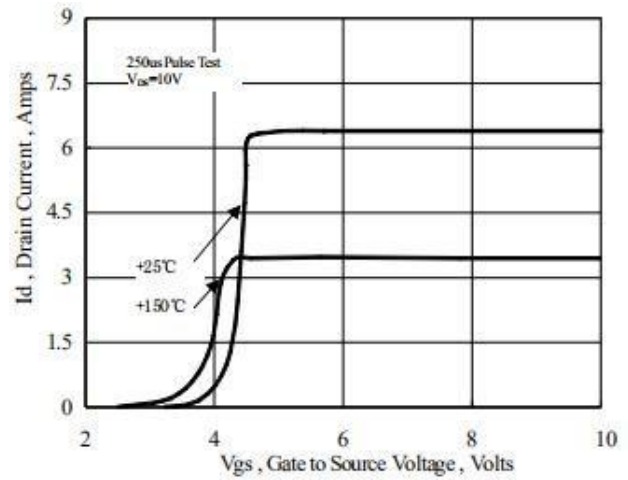


Figure 8. Typical Transfer Characteristic

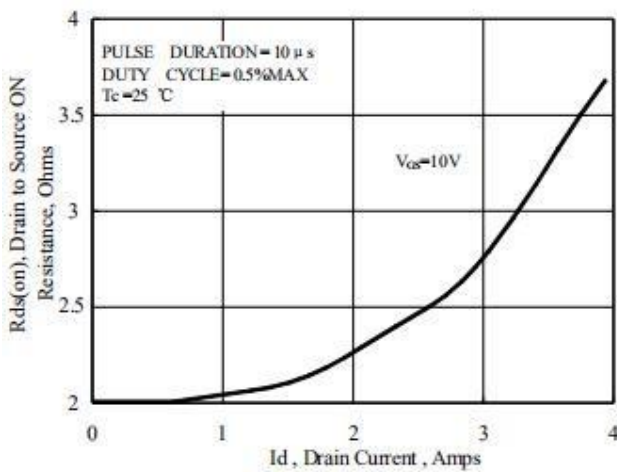


Figure 9. Typical Drain to Source ON Resistance vs Drain Current

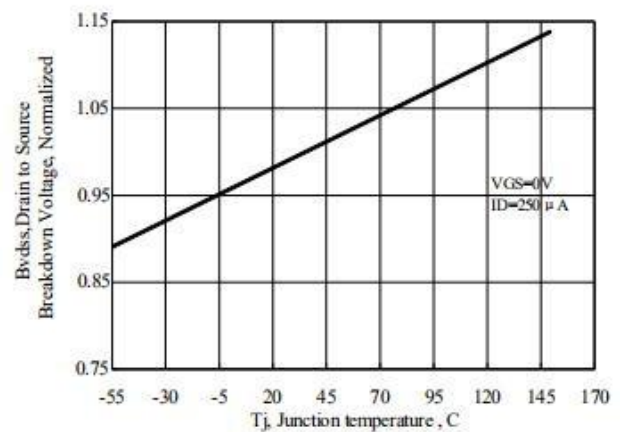


Figure 10. Typical Breakdown Voltage vs Junction Temperature

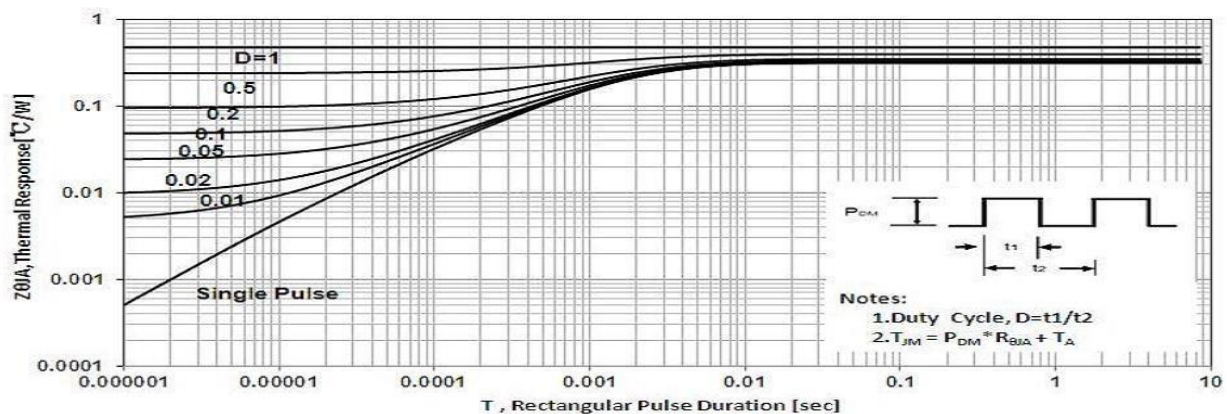
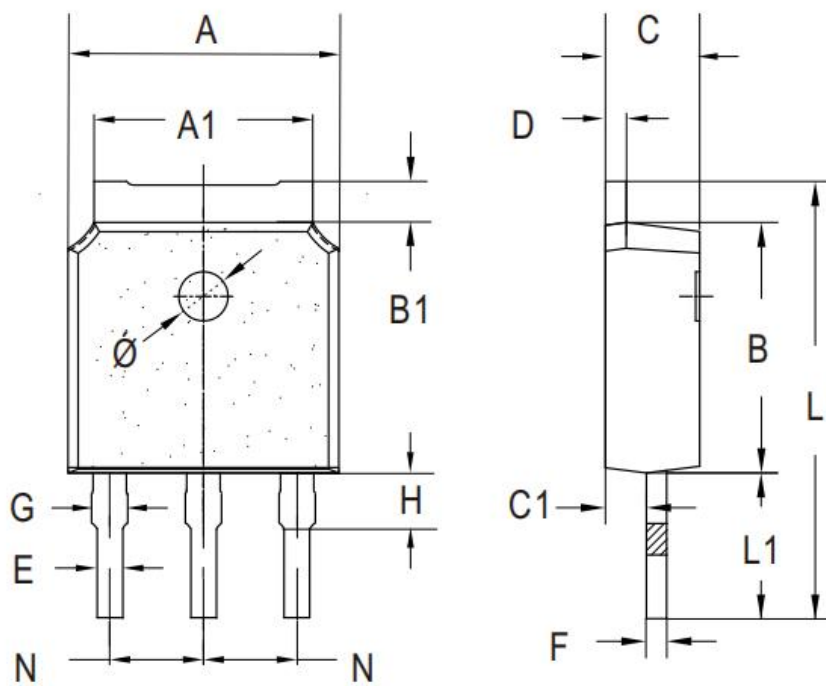


Figure 9 .Normalized Effective Transient Thermal Impedance With Pulse Duration(TO-251)

Package Information

TO-251 PACKAGE



Symbol	Millimeters		Symbol	Millimeters	
	Min.	Max.		Min.	Max.
A	6.50	6.70	F	0.40	0.60
A1	5.20	5.50	G	0.75	0.95
B	5.90	6.30	H	1.20	1.50
B1	0.90	1.25	L	9.80	11.80
C	2.20	2.40	L1	3.40	3.80
C1	0.90	1.10	N	2.20	2.40
D	0.40	0.60	Ø	1.00	1.30
E	0.65	0.85			

Revision History

Version	Date	Subjects (major changes since last revision)
1.0	2021-04-23	Datasheet Complete
1.1	2022-06-22	Updated POD
1.2	2026-06-01	Updated POD