

Features

- Low drain-source on-resistance: $R_{DS(ON)}=0.14\Omega(\text{typ})$
- Easy to control gate switching
- Enhancement mode: $V_{th} = 2.5$ to 3.5V
- 100% avalanche tested
- RoHS compliant

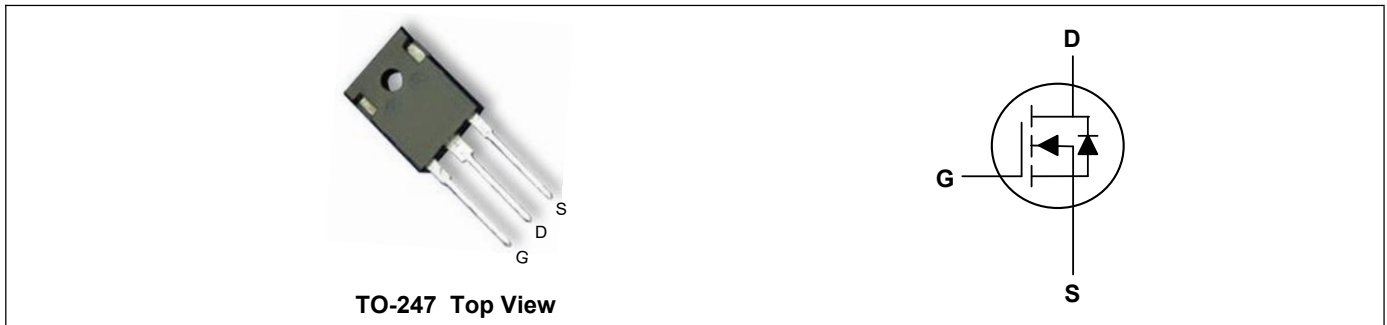
Key Performance Parameters



Parameter	Value	Unit
$V_{DS} @ T_{j,max}$	650	V
$R_{DS(ON),max}$	170	m Ω
I_D	20	A
$Q_{g,typ}$	38.5	nC
I_{DM}	60	A

Applications

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)
- Charger, Lighting



Absolute Maximum Ratings ($T_C=25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current ¹	I_D	20	A
Pulsed Drain Current ²	I_{DM}	60	A
Single Pulse Avalanche Energy ⁴	EAS	480	mJ
Avalanche Current	I_{AS}	3.5	A
Repetitive Avalanche energy, t_{AR} limited by $T_{j,max}$	E_{AR}	0.7	mJ
MOSFET dv/dt ruggedness, $V_{DS} = 0 \dots 400\text{V}$	dv/dt	50	V/ns
Reverse diode dv/dt ³ $V_{DS}=0 \dots 400\text{V}$, $I_{sp} \leq I_D$		50	
Total Power Dissipation ($T_C=25^\circ\text{C}$)	P_D	150	W
Storage Temperature Range	T_{STG}	-55 to 150	$^\circ\text{C}$
Operating Junction Temperature Range	T_J	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance Junction-Ambient	$R_{\theta JA}$	62	$^\circ\text{C/W}$
Thermal Resistance Junction-Case	$R_{\theta JC}$	0.83	$^\circ\text{C/W}$

Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	650	---	---	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=10A$	---	140	170	m Ω
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2.5	---	3.5	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=650V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	uA
		$V_{DS}=650V, V_{GS}=0V, T_J=150^\circ\text{C}$	---	---	100	
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 30V, V_{DS}=0V$	---	---	± 100	nA
Gate Resistance	R_G	$f = 1.0\text{MHz}$, open drain	---	8	---	Ω
Total Gate Charge	Q_g	$V_{DD}=400V, V_{GS}=10V, I_D=20A$	---	38.5	---	nC
Gate-Source Charge	Q_{gs}		---	8	---	
Gate-Drain Charge	Q_{gd}		---	15	---	
Turn-On Delay Time	$T_{d(on)}$	$V_{DD}=400V, V_{GS}=10V, R_G=25\Omega, I_D=20A$	---	25	---	ns
Rise Time	T_r		---	59	---	
Turn-Off Delay Time	$T_{d(off)}$		---	121	---	
Fall Time	T_f		---	44	---	
Input Capacitance	C_{iss}	$V_{DS}=100V, V_{GS}=0V, f=1\text{MHz}$	---	1724	---	pF
Output Capacitance	C_{oss}		---	72	---	
Reverse Transfer Capacitance	C_{rss}		---	6	---	

Drain-Source Diode Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Continuous Source Current	I_S	$T_C=25^\circ\text{C}$	---	---	20	A
Pulsed Source Current	I_{SM}		---	---	60	A
Diode Forward Voltage	V_{SD}	$V_G=0V, I_S=20A, T_J=25^\circ\text{C}$	---	0.9	1.2	V
Reverse Recovery Time	t_{rr}	$V_R=400V, I_F=20A, di_F/dt=100A/\mu s$	---	453	---	ns
Reverse Recovery Charge	Q_{rr}		---	5.1	---	uC
Peak Reverse Recovery Current	I_{rrm}		---	22	---	A

Note:

- Limited by $T_{J,max}$. Maximum Duty Cycle $D = 0.50$
- Pulse width t_p limited by $T_{J,max}$
- Identical low side and high side switch with identical R_G
- $V_{DD}=50V, R_G=25\Omega, I_{AS}=3.5A$

Typical Characteristics

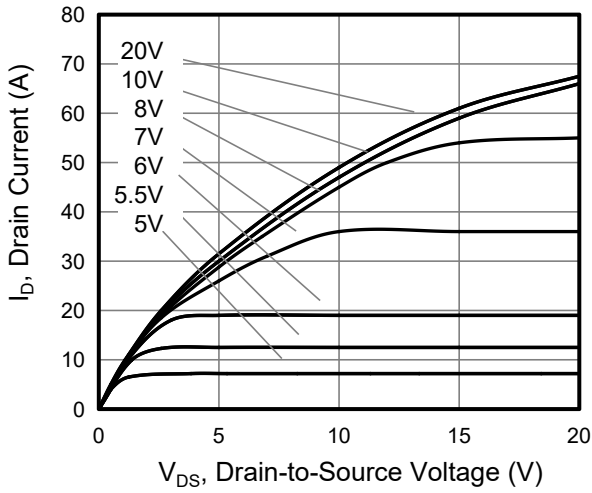


Figure 1. Output Characteristics

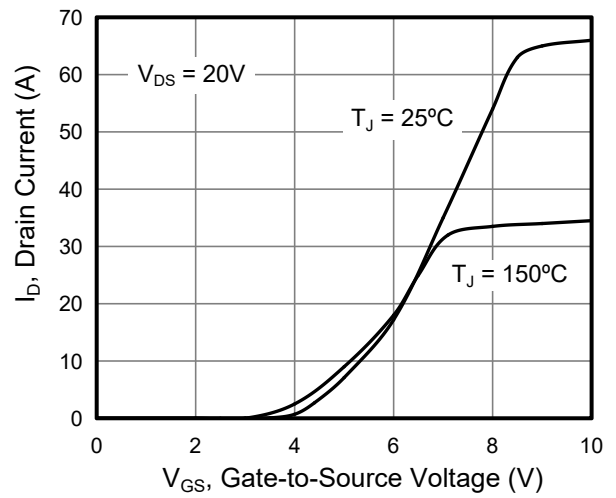


Figure 2. Transfer Characteristics

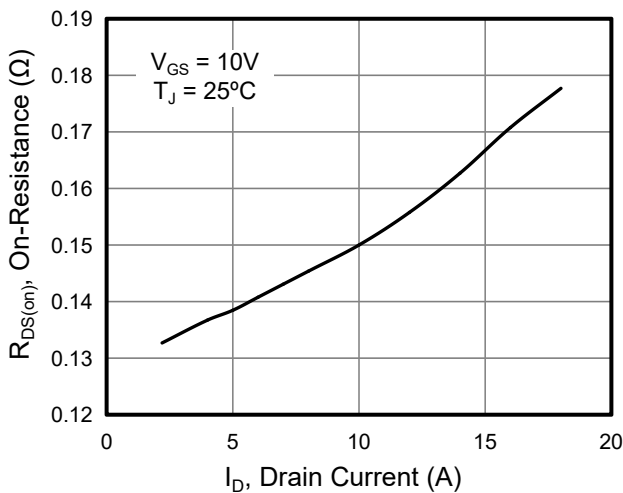


Figure 3. On-Resistance vs. Drain Current

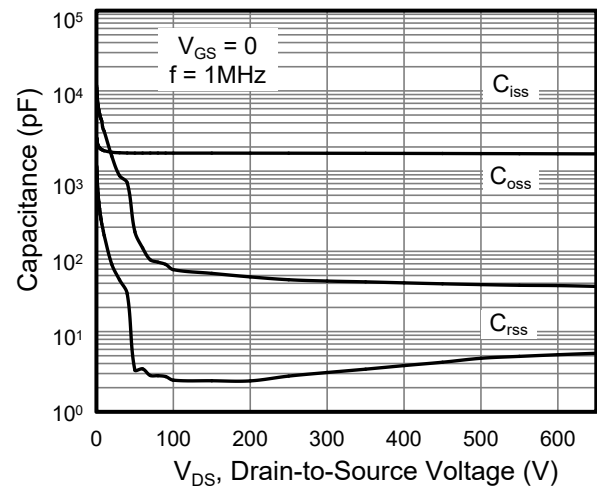


Figure 4. Capacitance

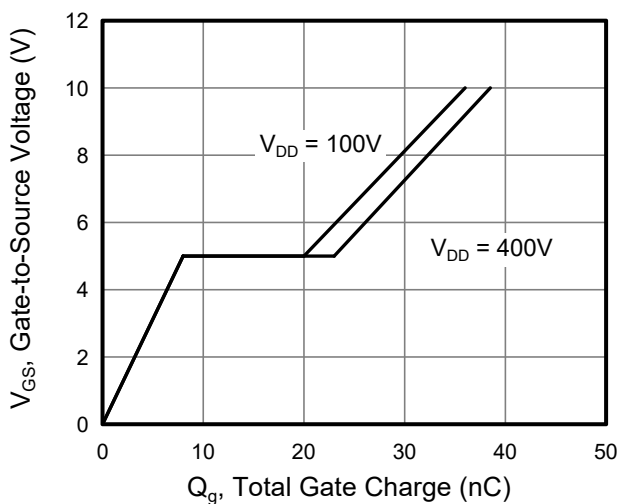


Figure 5. Gate Charge

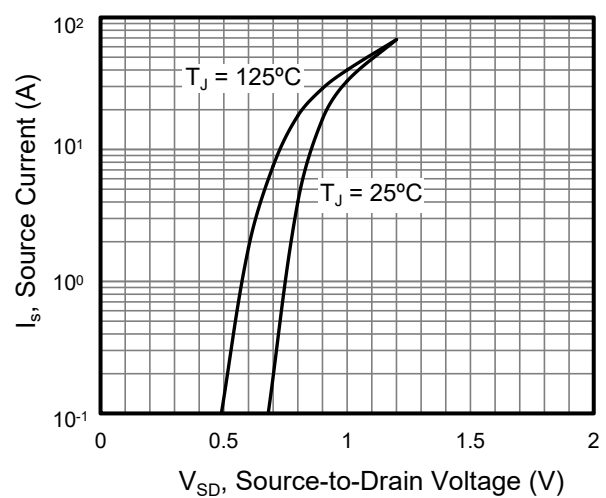


Figure 6. Body Diode Forward Voltage

650V Super Junction Power MOSFET

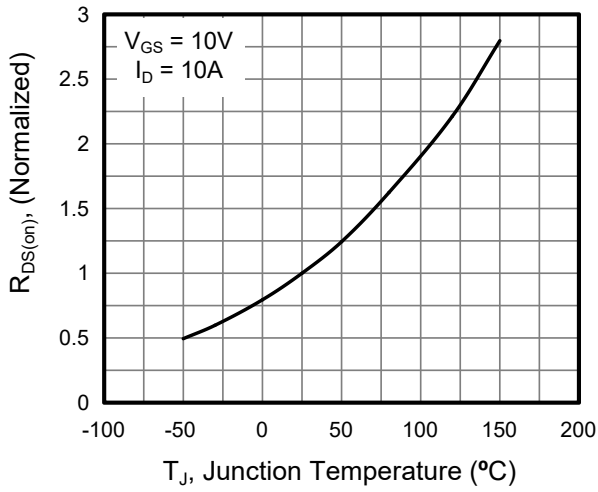


Figure 7. On-Resistance vs. Junction Temperature

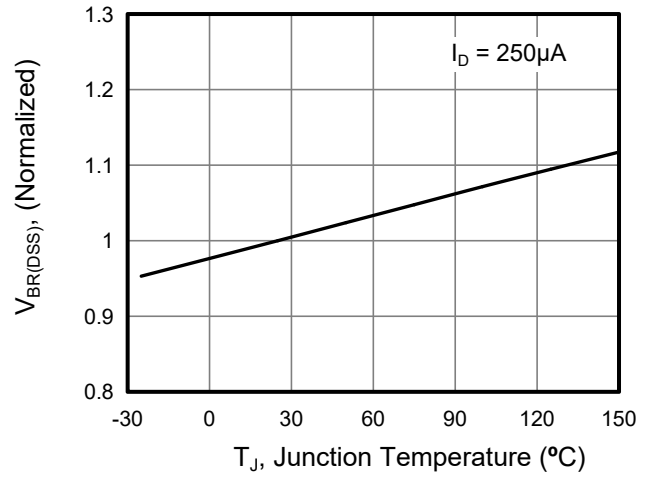


Figure 8. Breakdown voltage vs. Junction Temperature

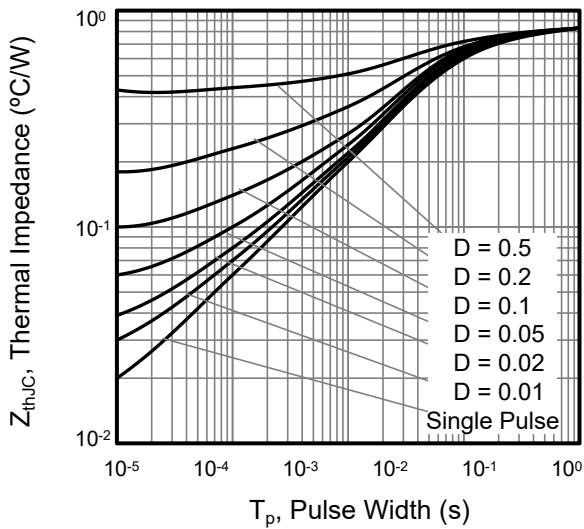
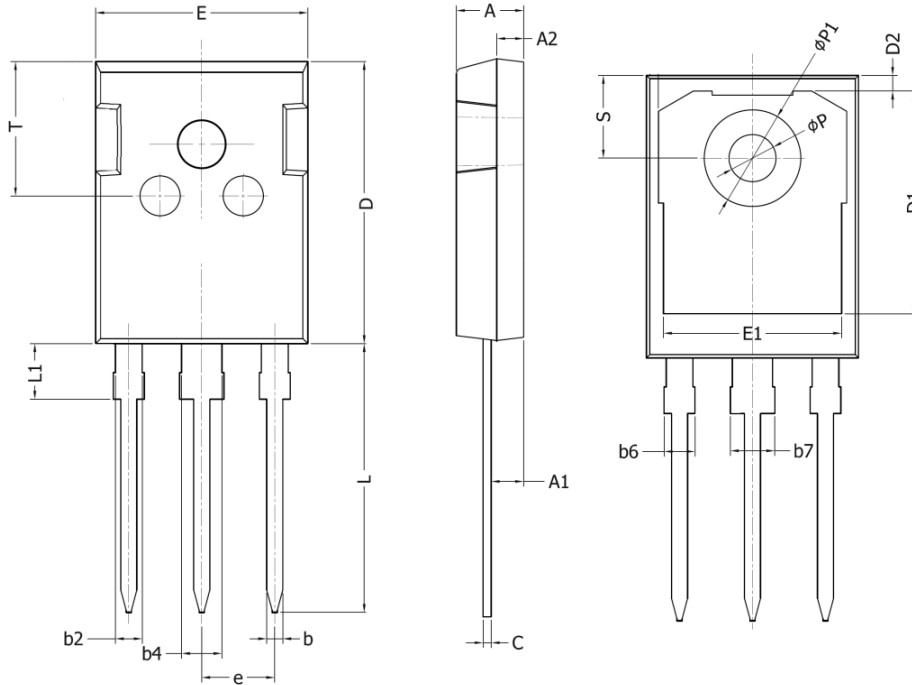


Figure 9. Transient Thermal Impedance TO-247

TO-247 Package Outline Dimensions



Symbol	Dimensions In Millimeters	
	Min.	Max.
A	4.90	5.20
A1	2.31	2.51
A2	1.9	2.1
b	1.16	1.26
b2	1.96	2.06
b4	2.96	3.06
b6	-	2.25
b7	-	3.25
C	0.59	0.66
D	20.90	21.20
D1	16.25	16.85
D2	1.05	1.35
E	15.75	16.10
E1	13.00	13.60
e	5.436 BSC	
L	19.80	20.20
L1	-	4.30
P	3.40	3.60
P1	7.00	7.40
S	6.05	6.25
T	9.80	10.20