

Features

- Low drain-source on-resistance: $R_{DS(ON)}=27m\Omega$ (typ)
- Very Low FOM ($R_{DS(on)} \times Q_g$)
- Fast switching
- 100% avalanche tested
- RoHS compliant

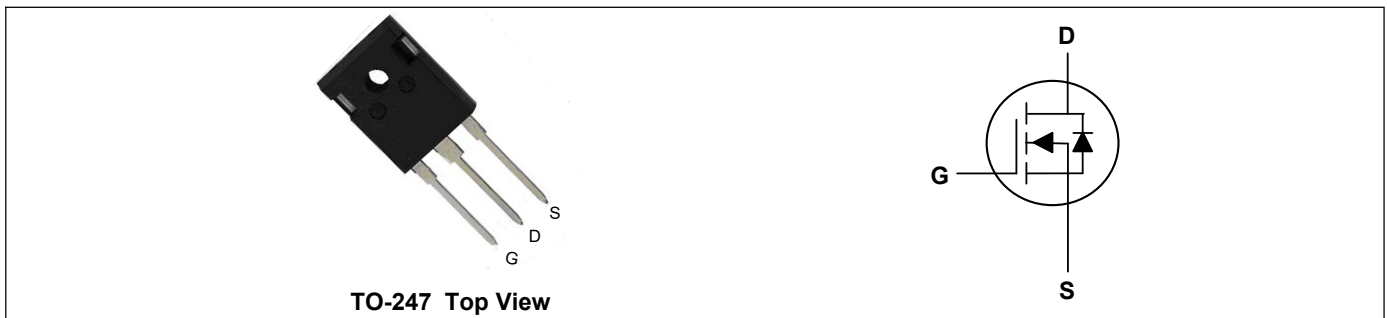
Key Performance Parameters



Parameter	Value	Unit
$V_{DS} @ T_{j,max}$	650	V
$R_{DS(ON),max}$	31	m Ω
I_D	89	A
$Q_{g,typ}$	151	nC
I_{DM}	267	A

Applications

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



Absolute Maximum Ratings ($T_C=25^\circ C$, 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	89	A
Pulsed Drain Current ²	I_{DM}	267	A
Single Pulse Avalanche Energy ⁴	EAS	414	mJ
Avalanche Current	I_{AS}	9.1	A
Repetitive Avalanche Energy	E_{AR}	5.10	mJ
MOSFET dv/dt ruggedness, $V_{DS} = 0 \dots 400V$	dv/dt	100	V/ns
Reverse diode dv/dt ³ $V_{DS}=0 \dots 400V, I_{SD} \leq I_D$		50	
Total Power Dissipation ($T_C=25^\circ C$)	P_D	500	W
Storage Temperature Range	T_{STG}	-55 to 150	$^\circ C$
Operating Junction Temperature Range	T_J	-55 to 150	$^\circ C$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance Junction-Ambient (Max)	$R_{\theta JA}$	62	$^\circ C/W$
Thermal Resistance Junction-Case (Max)	$R_{\theta JC}$	0.25	$^\circ C/W$

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	$R_{DS(ON)}$	$V_{GS}=10V, I_D=28A$	---	27	31	m Ω
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=5mA$	3.0	---	5.0	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=600V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	---	---	10	μA
		$V_{DS}=480V, V_{GS}=0V, T_J=125^{\circ}\text{C}$	---	170	---	μA
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	---	3	---	Ω
Total Gate Charge	Q_g	$V_{DD}=400V, V_{GS}=10V, I_D=28A$	---	151	---	nC
Gate-Source Charge	Q_{gs}		---	41	---	
Gate-Drain Charge	Q_{gd}		---	55	---	
Turn-On Delay Time	$T_{d(on)}$	$V_{DD}=400V, V_{GS}=10V, R_G=3.4\Omega, I_D=28A$	---	39	---	ns
Rise Time	T_r		---	56	---	
Turn-Off Delay Time	$T_{d(off)}$		---	136	---	
Fall Time	T_f		---	7.5	---	
Input Capacitance	C_{iss}	$V_{DS}=400V, V_{GS}=0V, f=250\text{MHz}$	---	8050	---	pF
Output Capacitance	C_{oss}		---	140	---	
Reverse Transfer Capacitance	C_{rss}		---	1.5	---	

Drain-Source Diode Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Continuous Source Current	I_S	$T_C=25^{\circ}\text{C}$	---	---	89	A
Pulsed Source Current	I_{SM}		---	---	267	A
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=1A, T_J=25^{\circ}\text{C}$	---	0.7	1.2	V
Reverse Recovery Time	t_{rr}	$V_R=400V, I_F=28A, di_F/dt=100A/\mu s$	---	180	---	ns
Reverse Recovery Charge	Q_{rr}		---	1.7	---	μC

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
- $R_G=25\Omega, I_{AS}=10.1A$, Starting $T_J=25^{\circ}\text{C}$

Typical Characteristics

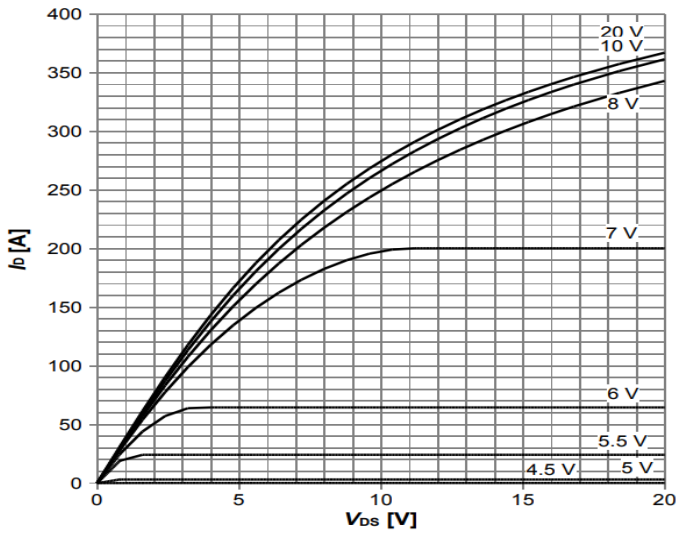


Figure 1: Typ. output characteristics

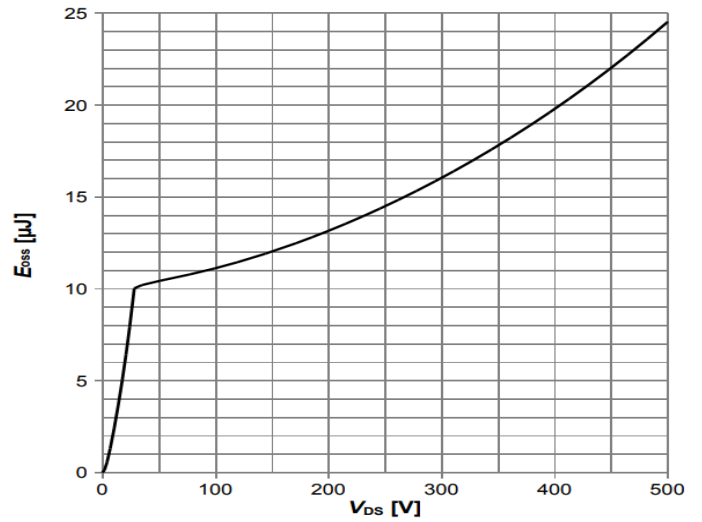


Figure 2: Typ. Coss stored energy

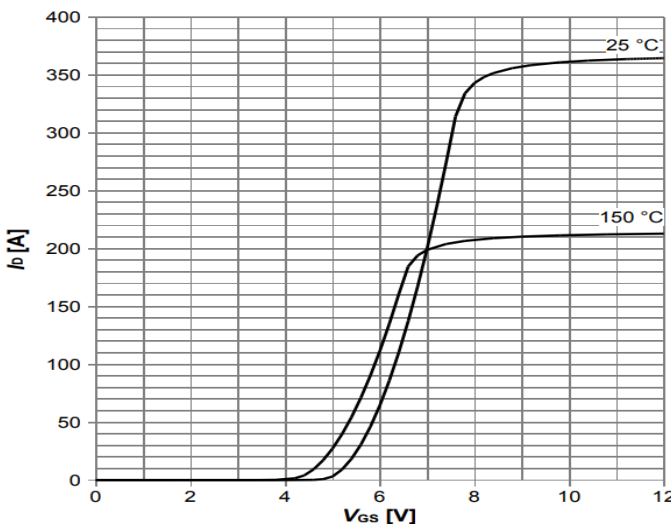


Figure 3: Typ. transfer characteristics

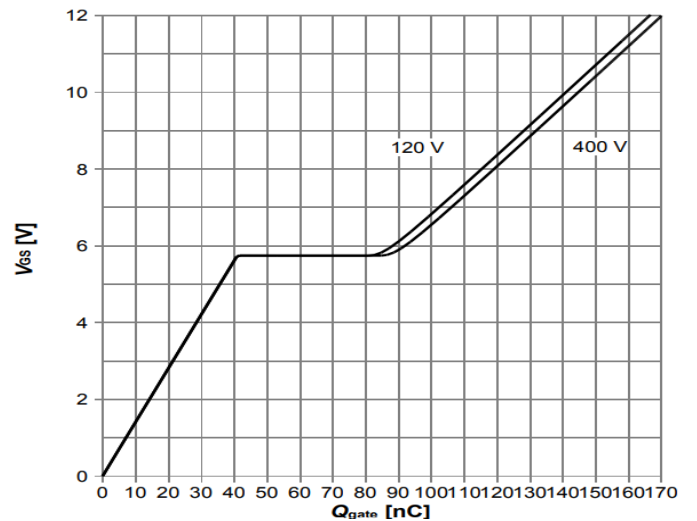


Figure 4: Typ. gate charge

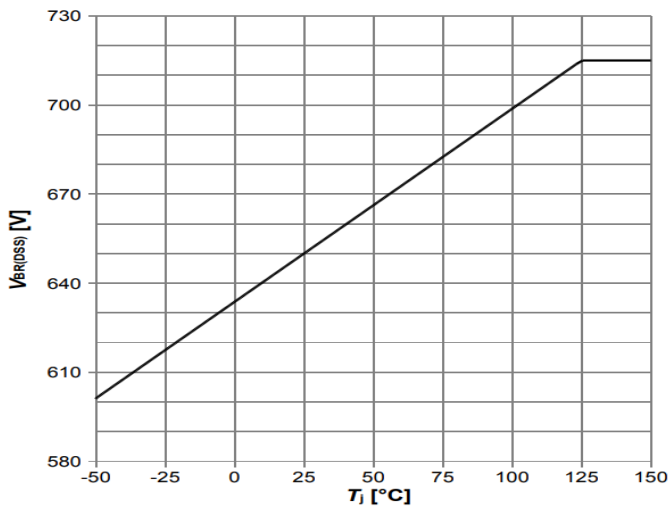


Figure 5: Drain-source breakdown voltage

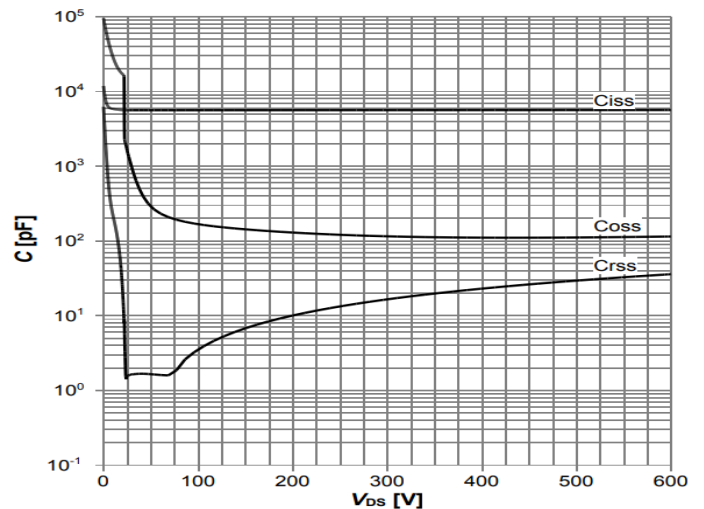


Figure 6: Typ. capacitances

650V Super Junction Power MOSFET

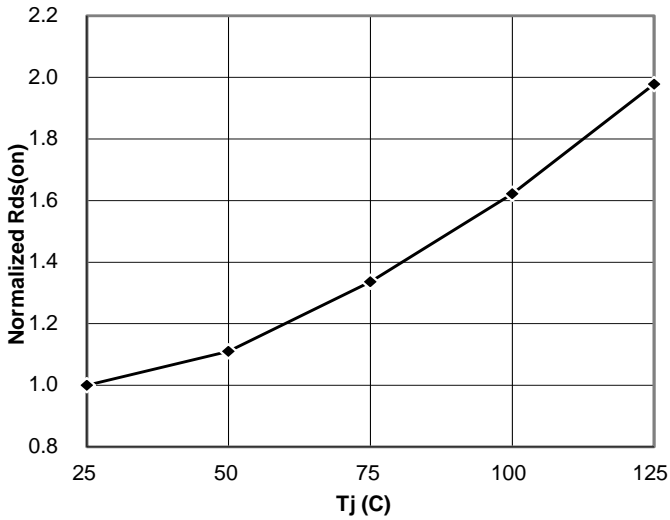


Figure 7:Typ. On-Resistance vs. Junction Temperature

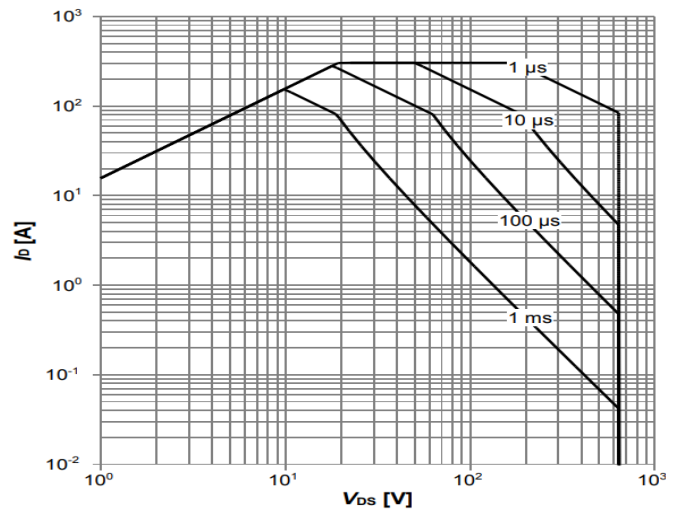


Figure 8: Safe operating area Tc=25°C, TO247

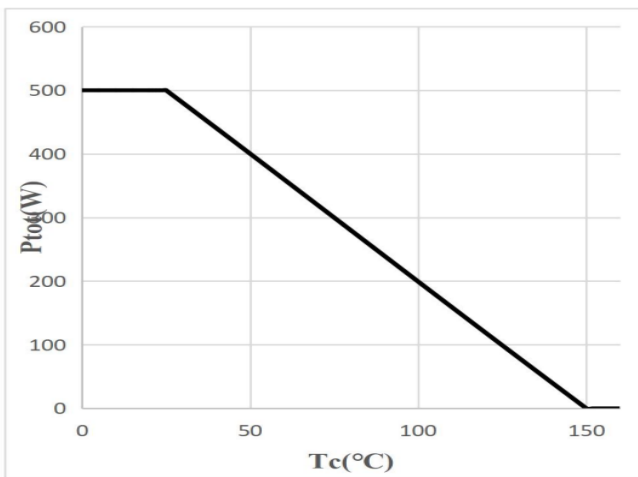


Figure 9: Typ. Power Dissipation

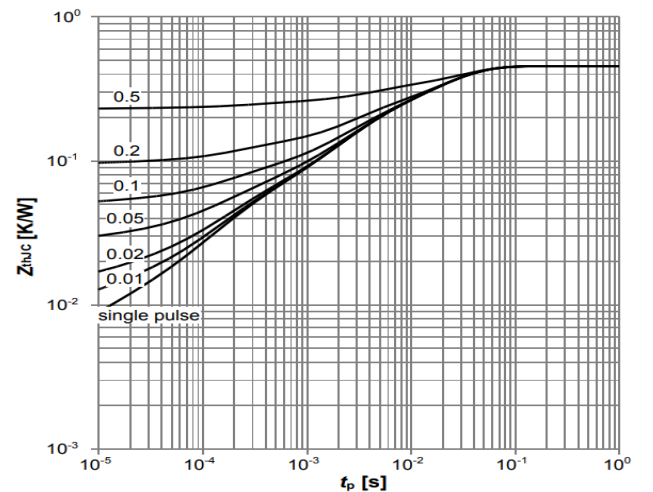


Figure 10: Max. transient thermal impedance

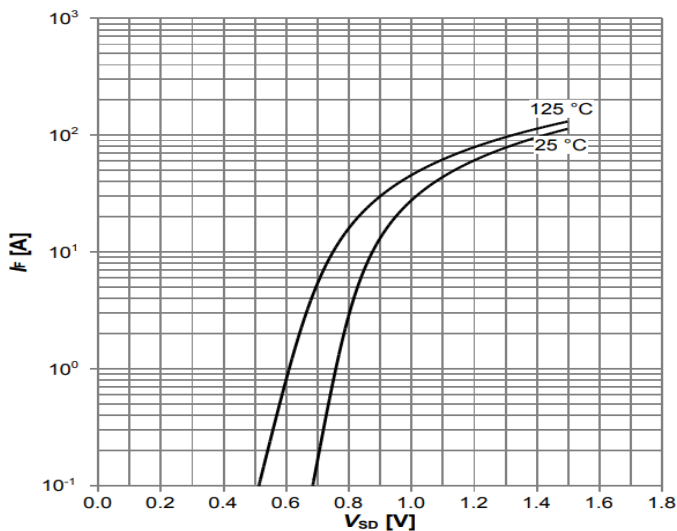


Figure 11: Forward characteristics of reverse diode

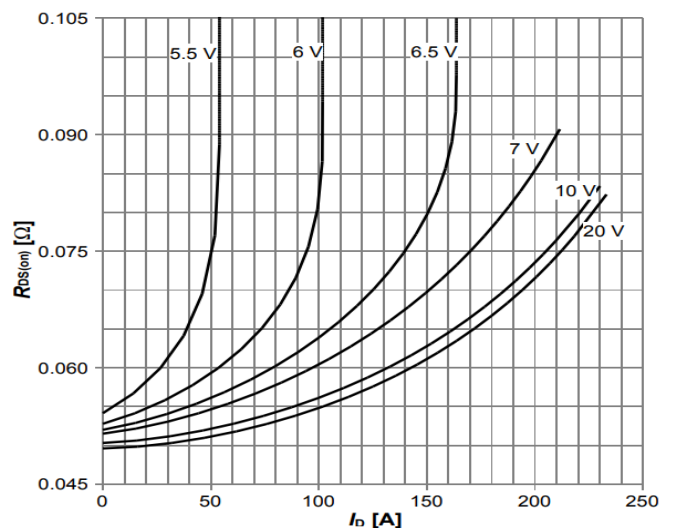
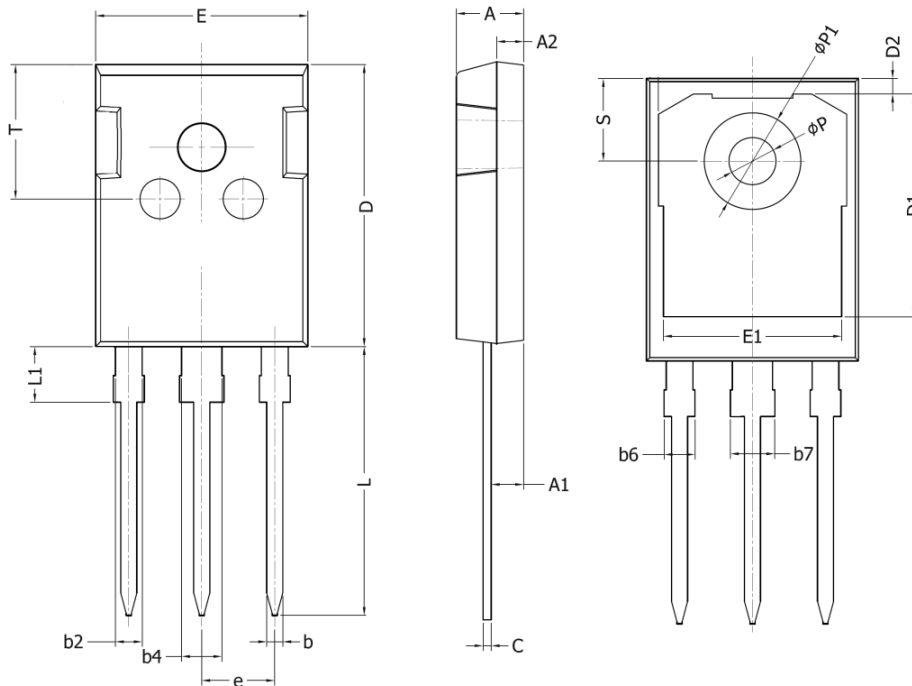


Figure 12: Typ. Drain-source on-state resistance

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