

Features

- Low drain-source on-resistance: $R_{DS(ON)}=0.46\Omega(\text{typ})$
- Easy to control gate switching
- Enhancement mode: $V_{th} = 2.5$ to $4.5V$
- 100% avalanche tested
- RoHS compliant

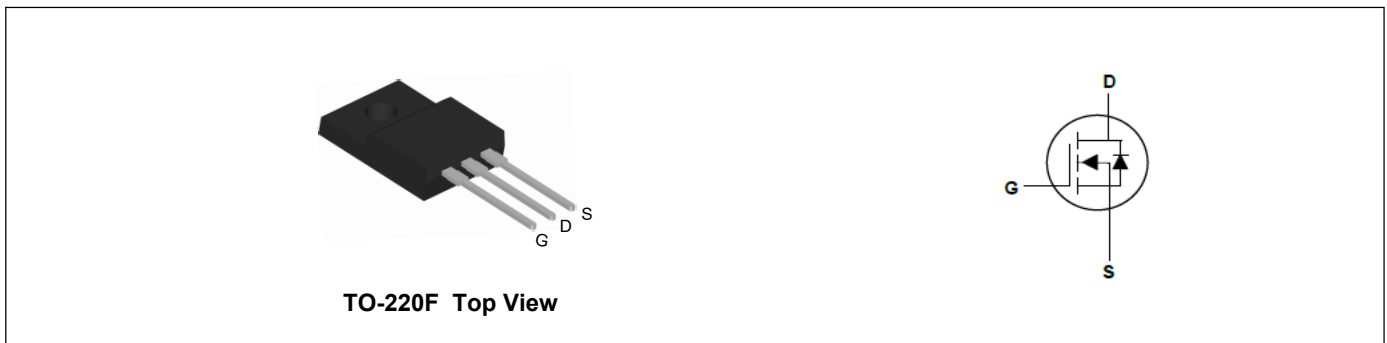
Key Performance Parameters



Parameter	Value	Unit
$V_{DS} @ T_{j,max}$	800	V
$R_{DS(ON),max}$	500	m Ω
I_D	11	A
$Q_{g,typ}$	38	nC
I_{DM}	30	A

Applications

- Switch Mode Power Supply (SMPS)
- TV power & LED Lighting Power
- AC to DC Converters
- Telecom



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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	800	V
Gate-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current ¹	$I_D @ T_C=25^\circ\text{C}$	11	A
Continuous Drain Current ¹	$I_D @ T_C=100^\circ\text{C}$	6.2	A
Pulsed Drain Current ²	I_{DM}	30	A
Single Pulse Avalanche Energy ⁴	EAS	132	mJ
Avalanche Current	I_{AS}	6.0	A
MOSFET dv/dt ruggedness, $V_{DS} = 0 \dots 400V$	dv/dt	50	V/ns
Reverse diode dv/dt ³ $V_{DS}=0 \dots 400V, I_{DS} \leq I_D$		15	
Total Power Dissipation ($T_C=25^\circ\text{C}$)	P_D	31	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 (Max)	$R_{\theta JA}$	80	$^\circ\text{C/W}$
Thermal Resistance Junction-Case (Max)	$R_{\theta JC}$	4	$^\circ\text{C/W}$

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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=1mA$	800	---	---	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=5.5A$	---	460	500	m Ω
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2.5	---	4.5	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=800V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	---	---	1	μA
		$V_{DS}=800V, V_{GS}=0V, T_J=150^{\circ}\text{C}$	---	---	100	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 30V, V_{DS}=0V$	---	---	± 100	μA
Total Gate Charge	Q_g	$V_{DS}=640V, V_{GS}=10V, I_D=11A$	---	38	---	nC
Gate-Source Charge	Q_{gs}		---	4	---	
Gate-Drain Charge	Q_{gd}		---	4.4	---	
Turn-On Delay Time	$T_{d(on)}$	$V_{DS}=400V, R_G=25\Omega, I_D=5.5A$	---	26	---	ns
Rise Time	T_r		---	60	---	
Turn-Off Delay Time	$T_{d(off)}$		---	75	---	
Fall Time	T_f		---	44	---	
Input Capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V, f=1MHz$	---	680	---	pF
Output Capacitance	C_{oss}		---	140	---	
Reverse Transfer Capacitance	C_{rss}		---	5	---	

Drain-Source Diode Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Continuous Source Current	I_S	$T_C=25^{\circ}\text{C}$	---	---	11	A
Pulsed Source Current	I_{SM}		---	---	30	A
Diode Forward Voltage	V_{SD}	$V_G=0V, I_S=11A, T_J=25^{\circ}\text{C}$	---	---	1.5	V
Reverse Recovery Time	t_{rr}	$V_{GS}=0V, I_F=11A, di/dt=100A/\mu s, T_J=25^{\circ}\text{C}$	---	270	---	ns
Reverse Recovery Charge	Q_{rr}		---	3.3	---	μC

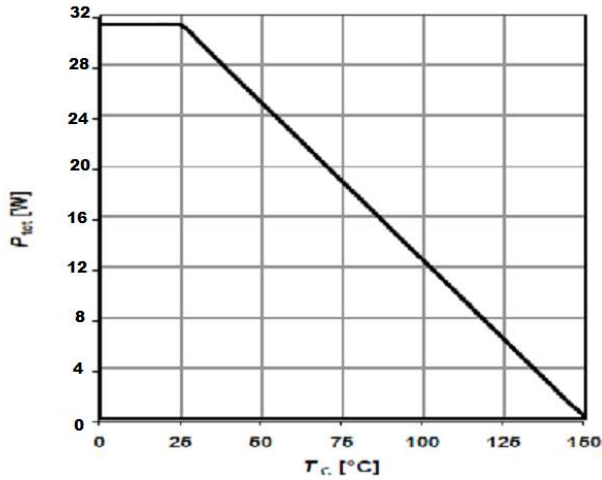
Note:

- 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
- $V_{DD}=50V, R_G=25\Omega, I_{AS}=8A$

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1 Power dissipation

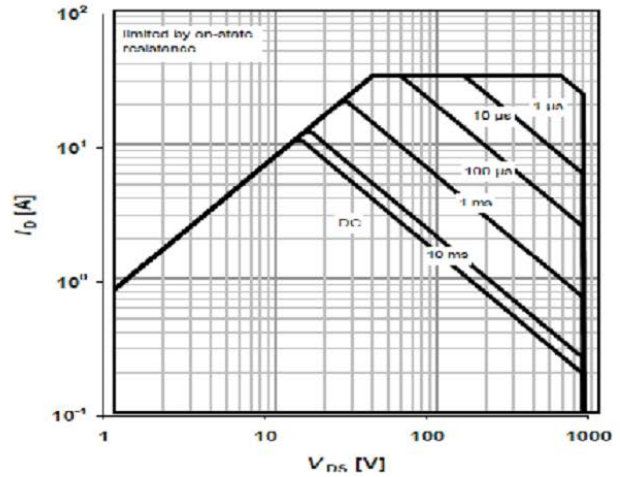
$P_{tot} = f(T_c)$



2 Safe operating area

$I_D = f(V_{DS}); T_c = 25^\circ\text{C}; D = 0$

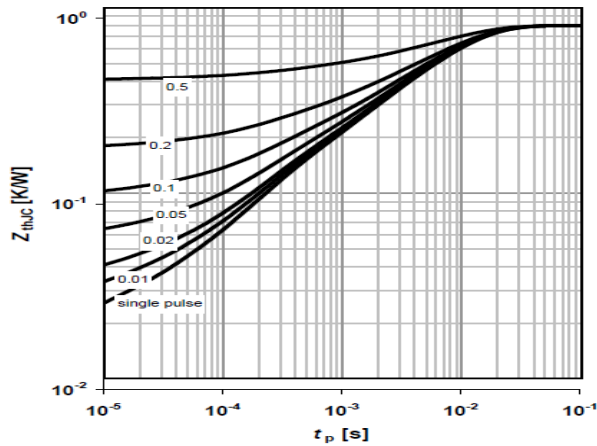
parameter: t_p



3 Max. transient thermal impedance

$Z_{thJC} = f(t_p)$

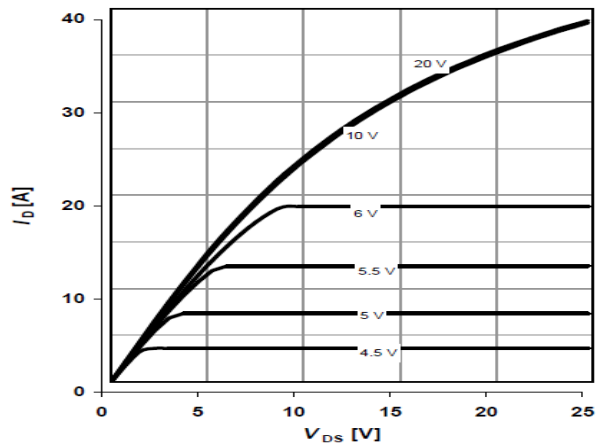
parameter: $D = t_p / T$



4 Typ. output characteristics

$I_D = f(V_{DS}); T_j = 25^\circ\text{C}; t_p = 10 \mu\text{s}$

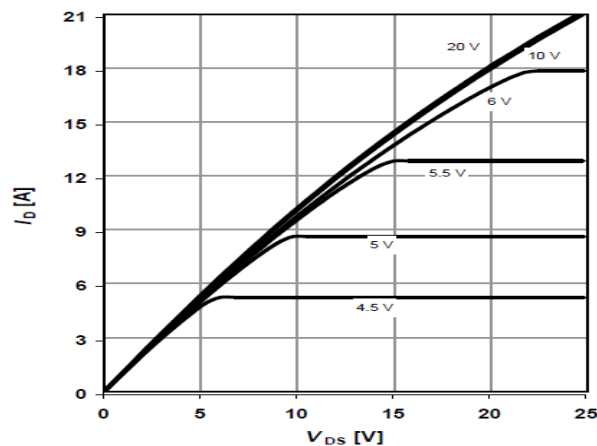
parameter: V_{GS}



5 Typ. output characteristics

$I_D = f(V_{DS}); T_j = 150^\circ\text{C}; t_p = 10 \mu\text{s}$

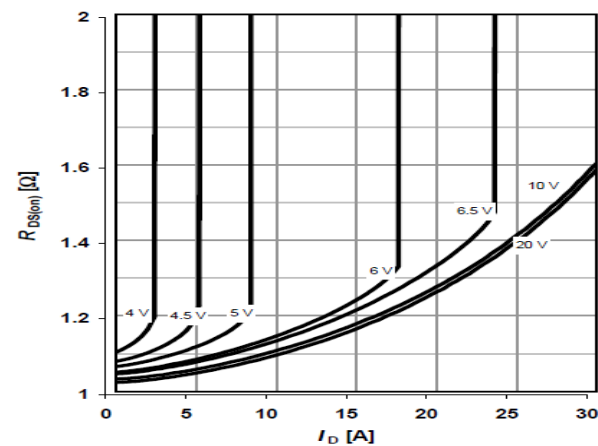
parameter: V_{GS}



6 Typ. drain-source on-state resistance

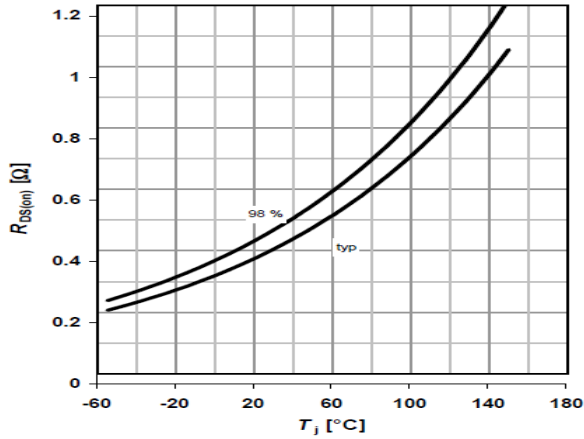
$R_{DS(on)} = f(I_D); T_j = 150^\circ\text{C}$

parameter: V_{GS}



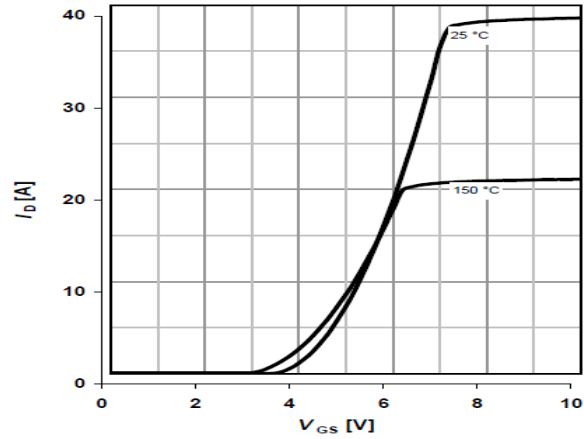
7 Drain-source on-state resistance

$R_{DS(on)}=f(T_j)$; $I_D=7.1\text{ A}$; $V_{GS}=10\text{ V}$



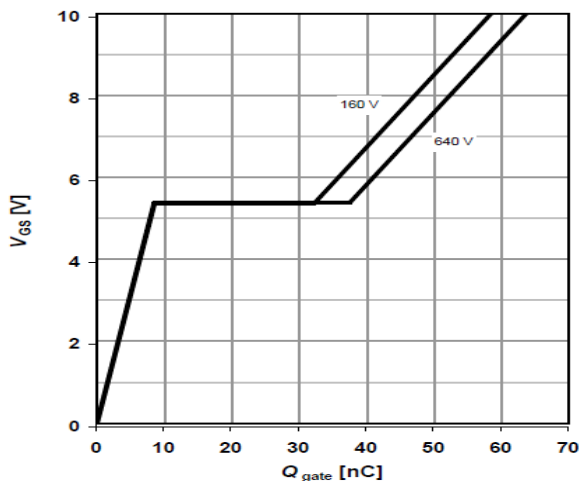
8 Typ. transfer characteristics

$I_D=f(V_{GS})$; $|V_{DS}|>2|I_D|R_{DS(on)max}$; $t_p=10\ \mu\text{s}$
parameter: T_j



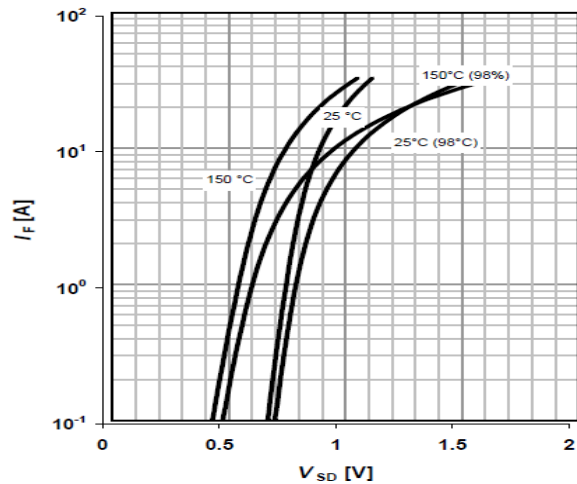
9 Typ. gate charge

$V_{GS}=f(Q_{gate})$; $I_D=11\text{ A pulsed}$
parameter: V_{DD}

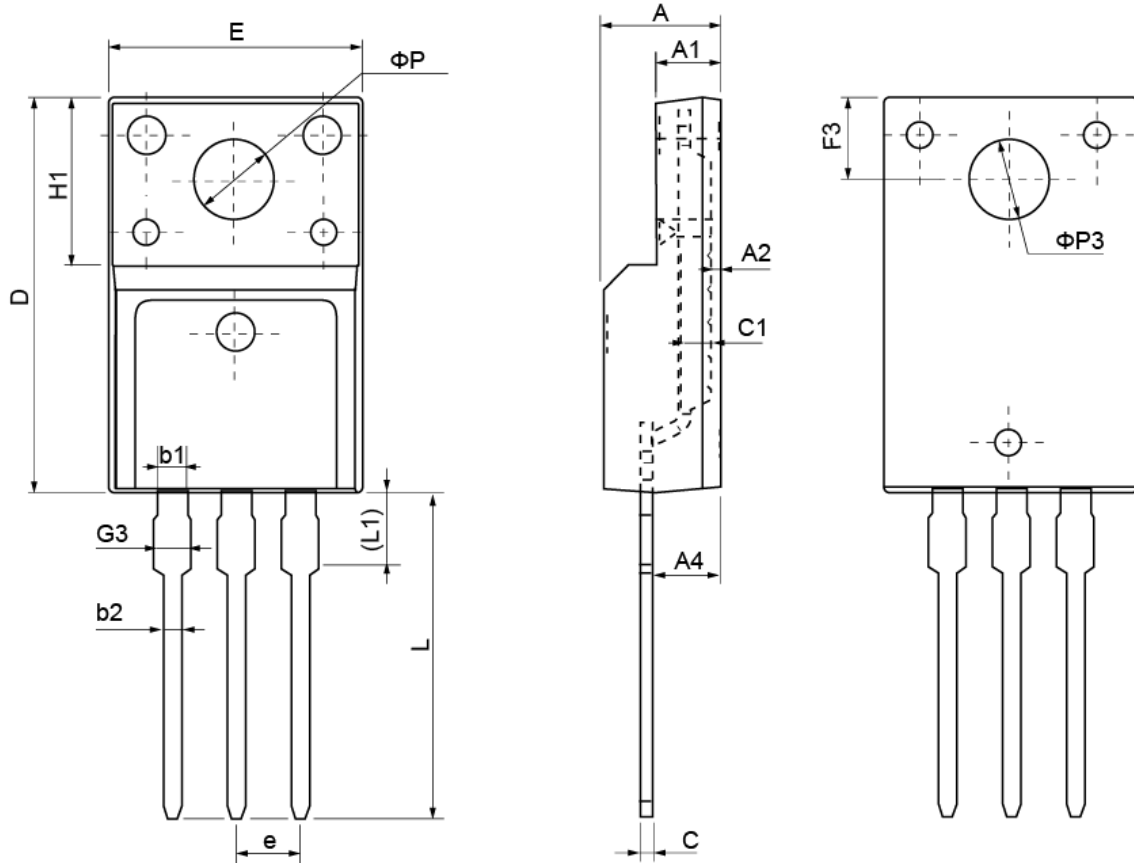


10 Forward characteristics of reverse diode

$I_F=f(V_{SD})$; $t_p=10\ \mu\text{s}$
parameter: T_j



TO-220F Package Outline Dimensions



Symbol	Dimensions (unit:mm)			Symbol	Dimensions (unit:mm)		
	Min	Typ	Max		Min	Typ	Max
A	4.40	4.70	5.00	H1	6.70 REF		
A1	2.30	2.55	2.80	L	12.30	12.98	13.30
A2	0.30	0.50	0.70	L1	2.95	3.10	3.50
A4	2.45	2.80	3.05	phi P	3.03	3.20	3.50
c	0.30	0.50	0.70	phi P3	3.15	3.45	3.65
c1	1.20	1.30	1.40	b1	1.10	1.30	1.45
D	15.40	15.90	16.40	b2	0.60	0.80	1.00
E	9.86	10.16	10.46	F3	3.05	3.30	3.55
e	2.54 BSC			G3	1.15	1.35	1.55