VFTA012R140NA

Datasheet

General Description

$V_{(BR)DSS}$	$R_{DS(ON)\_max}$	I_D
120V	14mΩ@10V	60A
	16mΩ@4.5V	

Symbol

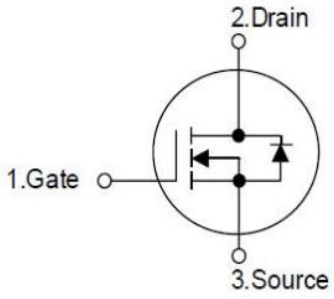


Figure 1 Symbol of VFTA012R140NA

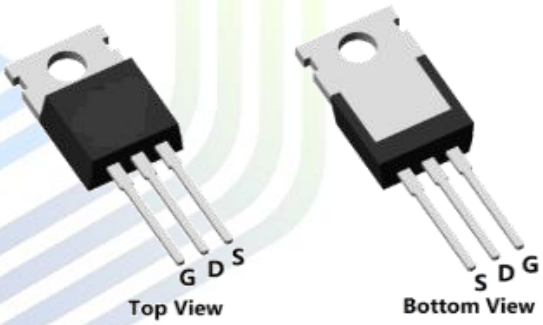
Features

- Low $R_{DS(ON)}$ & FOM
- Extremely low switching loss
- Fast switching and soft recovery
- Excellent reliability and uniform

Application

- Switched mode power supply
- Solar inverter
- UPS and energy inverter
- PD charger
- Motor driver

Package Type



TO-220

Figure 2 Package Type of VFTA012R140NA

Ordering Information

Product Name	Package
VFTA012R140NA	TO-220

Absolute Maximum Ratings (T_J= 25 ºC, unless otherwise specified)

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	120	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current Note 1,	T_C=25ºC	I_D	60	A
Pulsed Drain Current Note 2		I_{DM}	150	A
Max Power Dissipation Note 3,	T_C=25ºC	P_D	100	W
Avalanche Current, Single Pulse Note 5		I_{AS}	15	A
Avalanche Energy, Single Pulse Note 5		E_{AS}	71	mJ
Operation Junction temperature		T_J	-55 to 150	ºC

Thermal Resistance

Parameter	Symbol	Min	Typ	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$		1.19		ºC/W
Thermal Resistance, Junction-to-Ambient Note4	$R_{\theta JA}$		62		

Notes:

1) Calculated continuous current based on maximum allowable junction temperature.
2) Repetitive rating; pulse width limited by max. junction temperature.
3) P_D is based on max junction temperature, using junction-case thermal resistance.
4) The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with Ta=25 °C.
5) V_{DS}=25 V,V_{GS}=10 V, L=0.5 mH, starting T_J=25 °C.

Electrical Characteristics (T_J= 25 ºC, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250uA	100			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=120V, V_{GS}=0V			1	uA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V			±100	nA
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250uA	1.0	2	2.5	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=20A		7.7	14	mΩ
		V_{GS}=4.5V, I_D=10A		9.1	16	mΩ
Gate Resistance	R_G	V_{GS}=0V,V_{DS}=0V,f=1MHz		4.2		Ω
Dynamic Characteristics						
Input Capacitance	C_{ISS}	V_{GS}=0V		2242		pF
Output Capacitance	C_{OSS}	V_{DS}=25V		1244		pF
Reverse Transfer Capacitance	C_{RSS}	f=1MHz		63.2		pF
Turn-on Delay Time	$t_{d(on)}$	V_{GS}=10V,		6.4		ns
Rise Time	t_r	V_{DS}=60V,		42.9		
Turn-off Delay Time	$t_{d(off)}$	I_D=20A		64.4		
Fall Time	t_f	R_G=6.8Ω		65.1		
Switching Characteristics						
Total Gate Charge (@V_{GS}=10V)	Q_g	V_{GS}=0 to 10V		38.1		nC
Total Gate Charge (@V_{GS}=4.5V)	Q_g	V_{DS}=60V		16.4		
Gate to Source Charge	Q_{gs}	I_D=30A		8.1		
Gate to Drain Charge	Q_{gd}			5.8		
Reverse Diode Characteristics						
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_{SD}=20A		0.8	1.2	V
Reverse Recovery Time	t_{rr}	V_R=50V		53.4		ns
Reverse Recovery Charge	Q_{rr}	I_F=10A		170.8		nC
Peak Reverse Recovery Current	I_{rrm}	di/dt=100A/us		6.4		A

Typical Performance Characteristics

Figure 3: Typ. Output Characteristics

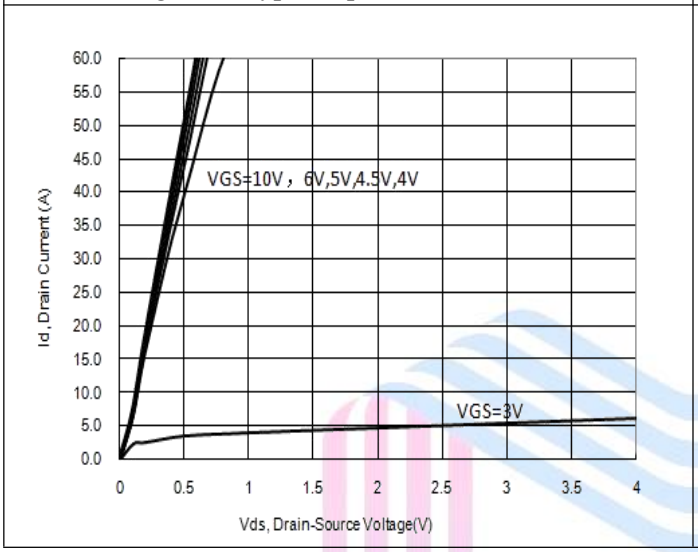


Figure 4: Typ. Transfer Characteristics

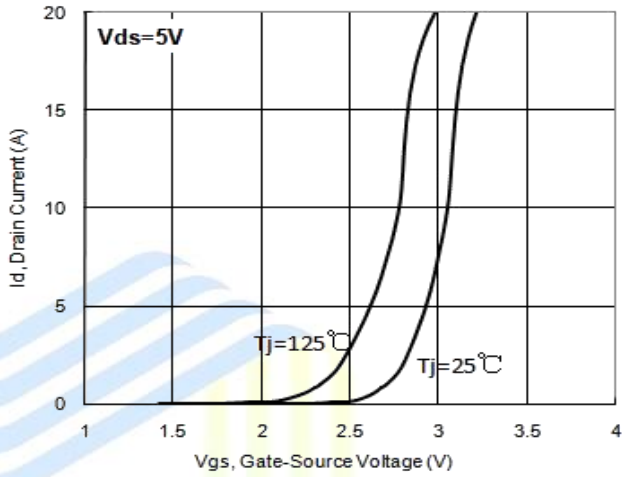


Figure 5: Drain-Source On-State Resistance

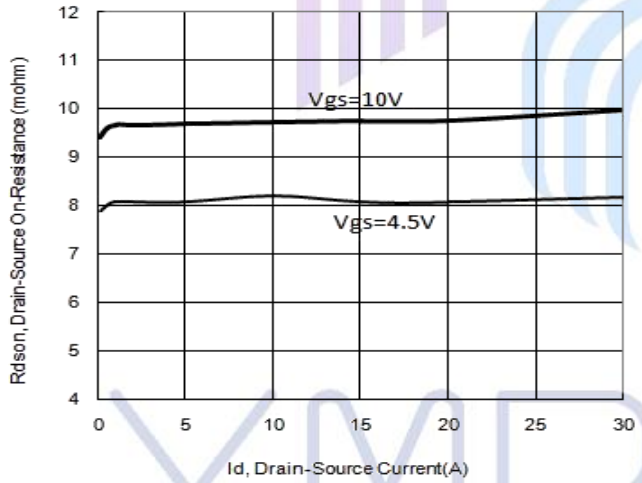


Figure 6: Drain-Source On-State Resistance

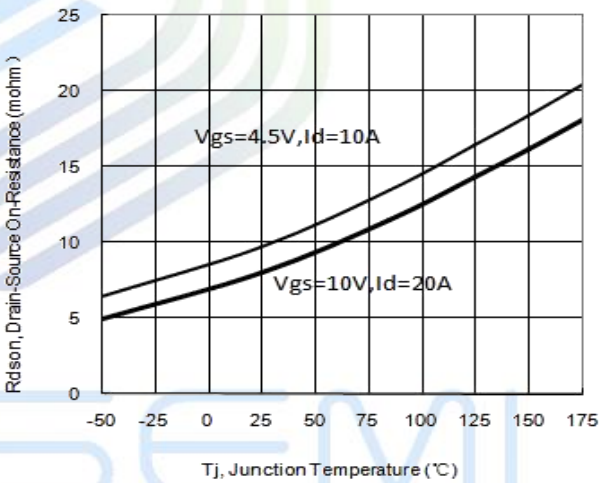


Figure 7: On-Resistance vs.Gate-source voltage

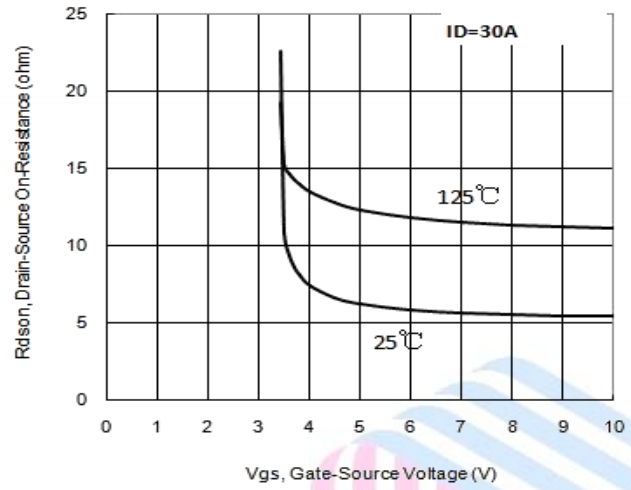


Figure 8: Forward Characteristics of Body Diode

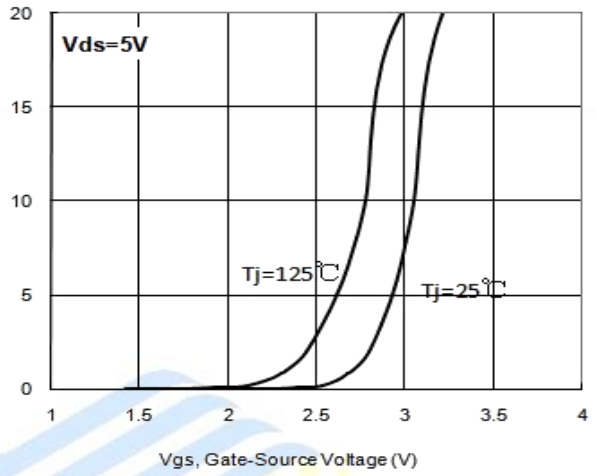


Figure 9: Gate Charge Characteristics

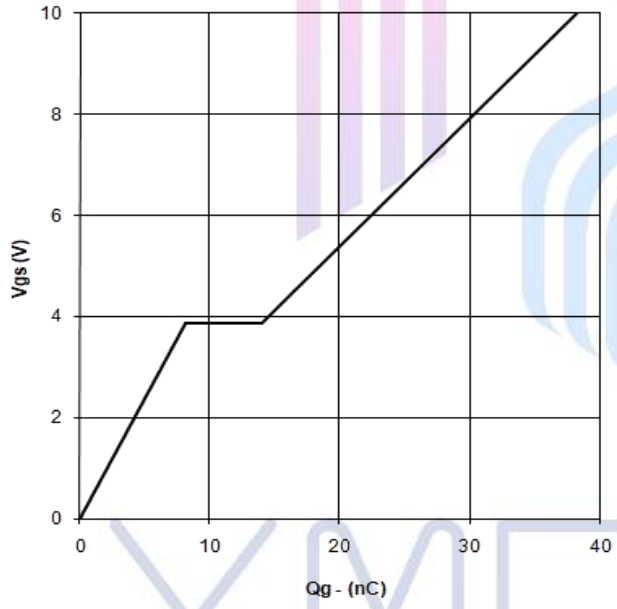


Figure 10: Typ. Capacitances

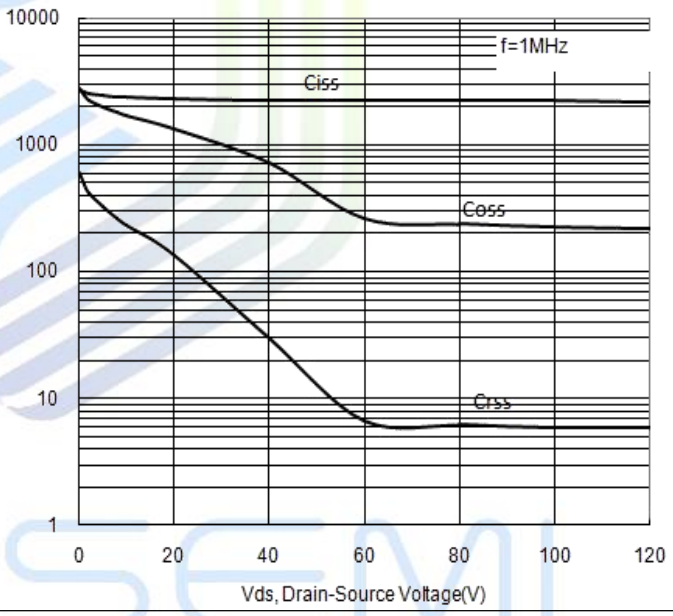


Figure11: Safe Operating Area

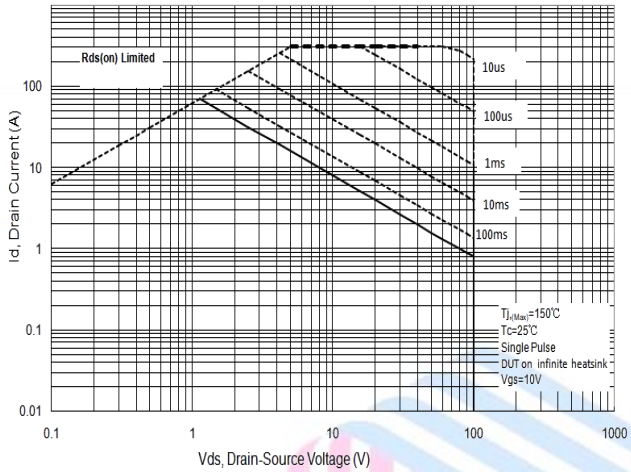


Figure12: Power Dissipation

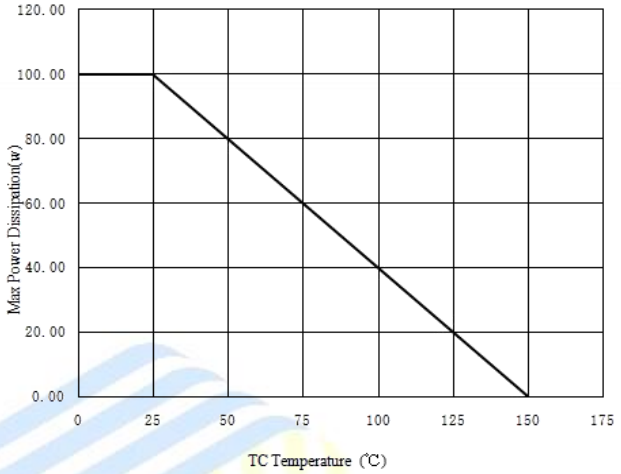


Figure 13: Single pulse power rating, Junction to case

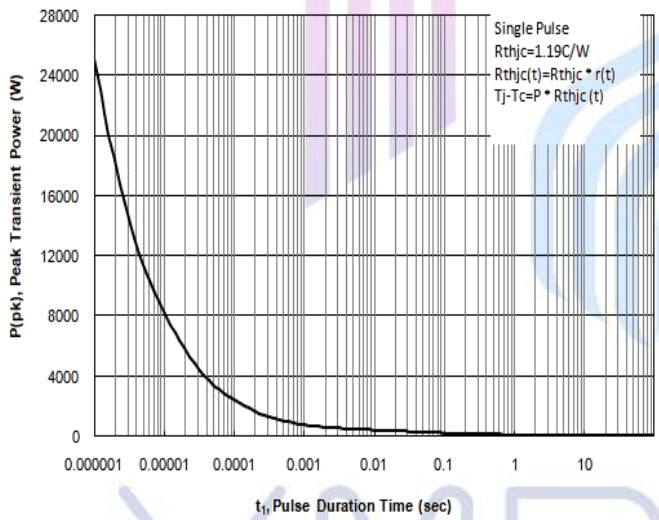
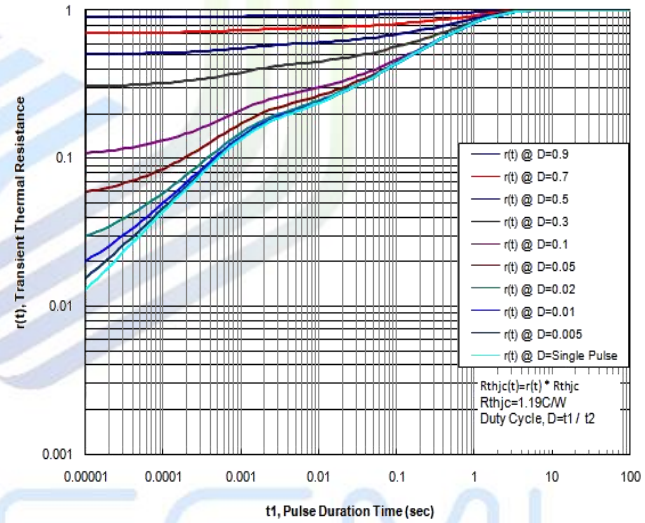
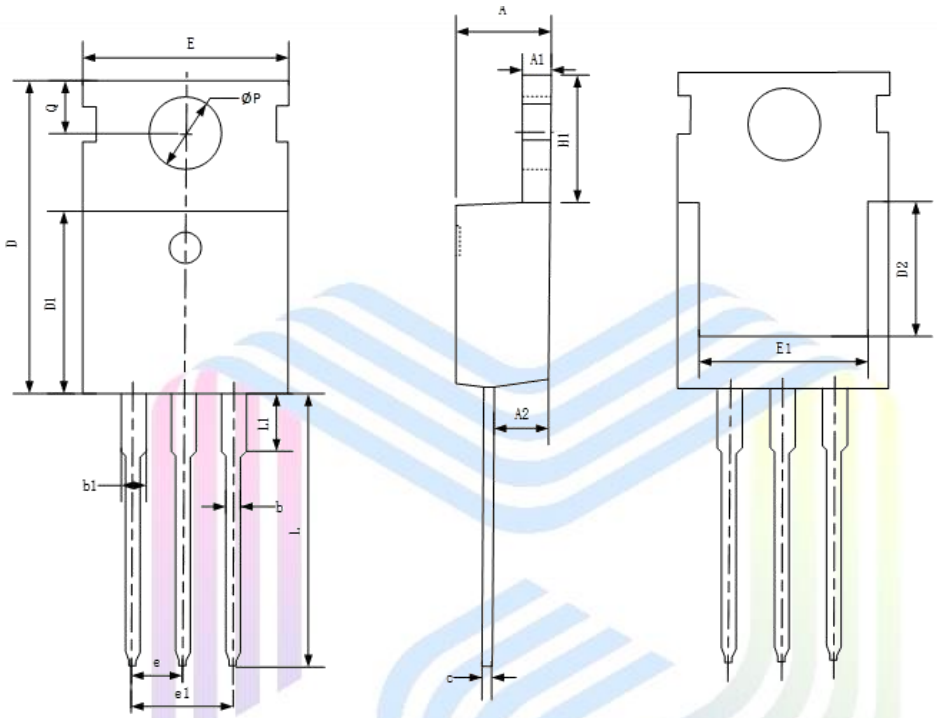


Figure 14: Max transient thermal impedance



Mechanical Dimensions

TO-220 Package Information



SYMBOL	MILLIMETER	
	MIN	MAX
A	4. 37	4. 70
A1	1. 25	1.40
A2	2. 20	2.60
b	0. 70	0.95
b1	1. 17	1.47
c	0.45	0. 60
D	15. 10	16. 10
D1	8. 80	9.40
D2	5. 50	-
E	9. 70	10. 30
E1	7.00	-
e	2. 54 BSC	
e1	5.08 BSC	
H1	6.25	6. 85
L	12. 75	13. 80
L1	-	3.40
ØP	3. 40	3.80
Q	2. 60	3.00

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