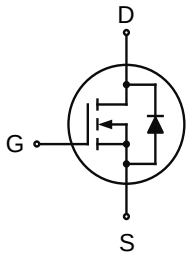
APA65R640FM

Super-junction Power Mosfet

DATA SHEET

Features

- 650V,7A
  $R_{DS(ON)}$ <640mΩ@V_{GS}=10V TYP:523mΩ
- advanced super junction technology
- extremely low on resistance



Schematic Diagram

Applications

- Power faction correction (PFC)
- Switched mode power supplies (SMPS)
- Uninterruptible power supply (UPS)
- LED lighting powe

TO-220F

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
A65R640FM	APA65R640FM	TO-220F	-	-	1000

ABSOLUTE MAXIMUM RATINGS (T_a=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current (T_c =25℃)	I_D	7	A
Continuous Drain Current (T_c=100℃)	I_D	4.4	A
Pulsed Drain Current (1)	I_{DM}	28	A
Single Pulsed Avalanche Energy (2)	E_{AS}	249	mJ
Drain Power Dissipation	P_D	35	W
Thermal Resistance from Junction to Case	$R_{\theta JC}$	2.08	℃/W
Thermal Resistance- Junction to Ambient	$R_{\theta JA}$	62.0	℃/W
Junction Temperature	T_J	150	℃
Storage Temperature	T_{STG}	-55~ +150	℃
Maximum Lead temperature for soldering Purpose	T_L	300	℃

MOSFET ELECTRICAL CHARACTERISTICS(T_a=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =250μA	650	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS} =650V, V_{GS} = 0V	-	-	100	nA
Gate-body leakage current	I_{GSS}	V_{GS} =±30V, V_{DS} = 0V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	2.0	3.4	4.0	V
Forward Transconductance (3)	g_{FS}	V_{DS}=25V, I_D=7A	-	4.9	-	S
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =10V, I_D =5.5A	-	523	640	mΩ
Dynamic characteristics						
Input Capacitance	C_{iss}	V_{DS} =100V, V_{GS} =0V, f =1.0MHz	-	423	-	pF
Output Capacitance	C_{oss}		-	26	-	
Reverse Transfer Capacitance	C_{rss}		-	1.7	-	
Switching characteristics (3,4)						
Turn-on delay time	$t_{d(on)}$	V_{DD}=325V, I_D=7A, R_G=24Ω, V_G=10V	-	11.2	-	ns
Turn-on rise time	t_r		-	28.6	-	
Turn-off delay time	$t_{d(off)}$		-	46.7	-	
Turn-off fall time	t_f		-	24.4	-	
Total Gate Charge	Qg	V_{DS}=520V, I_D=7A, V_{GS}=10V	-	16.4	-	nC
Gate-Source Charge	Qgs		-	3.5	-	
Gate-Drain Charge	Qgd		-	8.3	-	
Source-Drain Diode characteristics						
Diode Forward voltage	V_{SD}	T_c=25℃, V_{GS} =0V, I_S=7A	-	0.87	1.4	V
Diode Forward current	I_S	T_c =25℃	-	-	11	A
Body Diode Reverse Recovery Time (3)	trr	T_c=25℃，IF=7A,di/dt=100A/us		340		ns
Body Diode Reverse Recovery Charge	Qrr	T_c=25℃，IF=7A,di/dt=100A/us		2.5		uc

Notes:

1. Pluse width limited by maximum junction temperature
2. L=79mH, IAS=2.2A, VDD=100V, VG=10V, RG=25Ω, starting TJ=25°C
3. Pulse Test: Pulse width ≤300μs, Duty cycle≤2%
4. Essentially independent of operating temperature

Typical Performance Characteristics

Figure 1.On-Region Characteristics

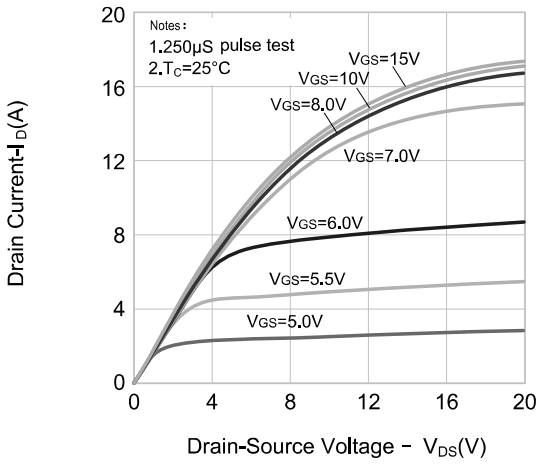


Figure 2.Transfer Characteristics

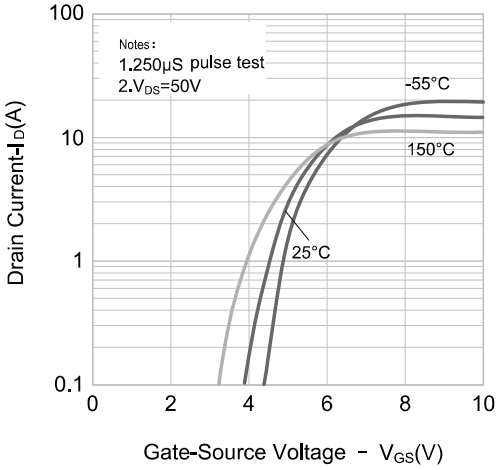


Figure 3.On-Resistance Variation vs. Drain-Current,Gate Voltage

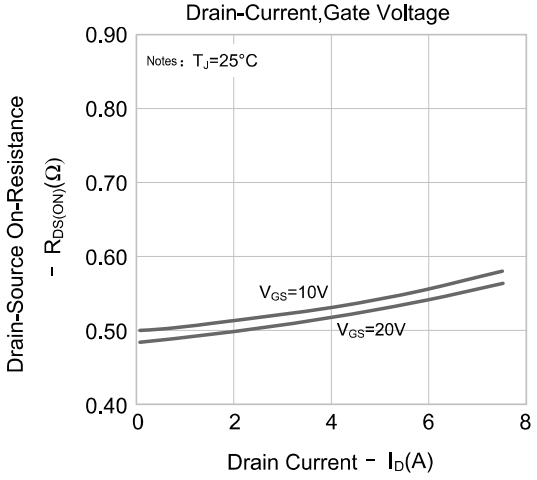


Figure 4.Body Diode Forward Voltage Variation vs.Source Current and Temperature

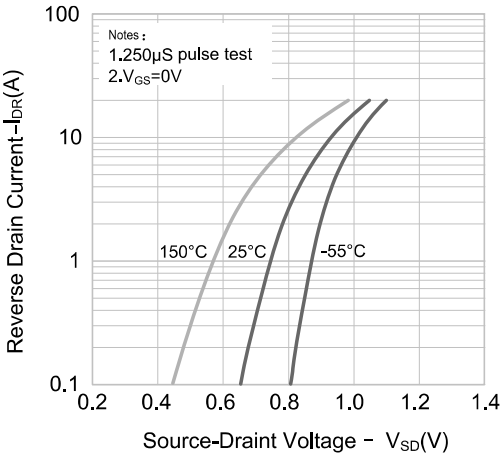


Figure 5.Capacitance Characteristics

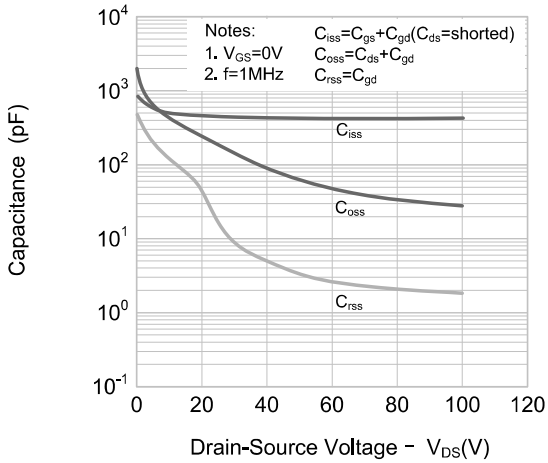
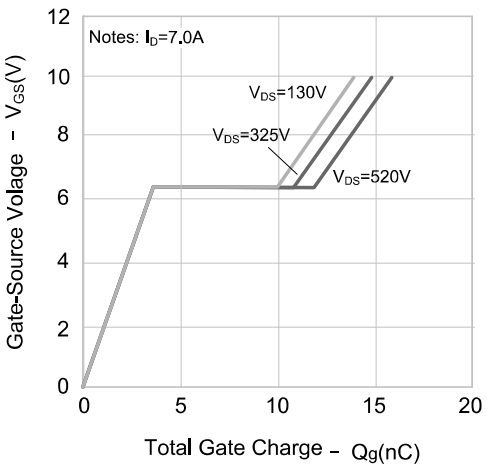


Figure 6.Gate Charage Characteristics



Typical Performance Characteristics

Figure 7. Breakdown Voltage Variation vs. Temperature

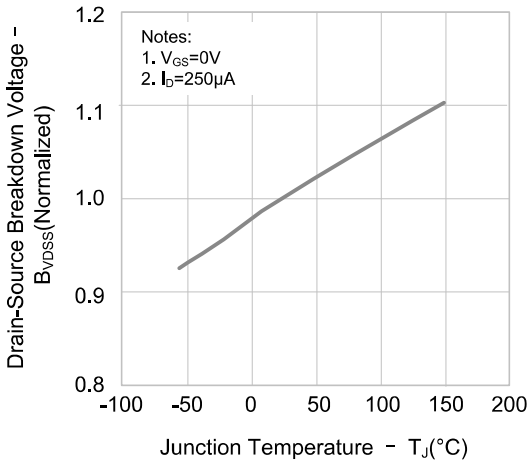


Figure 8. On-resistance Variation vs. Temperature

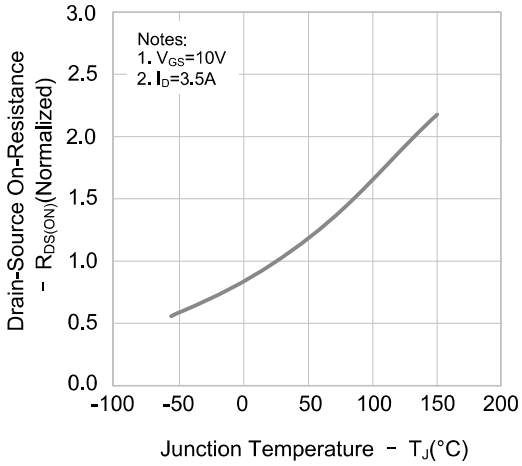


Figure 9.1 Max. Safe Operating Area (SCD65R640C)

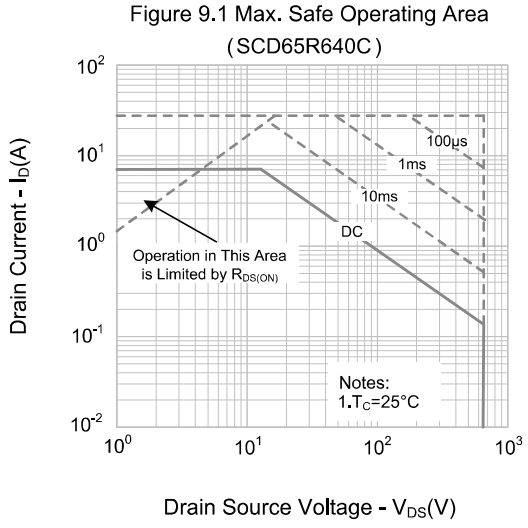
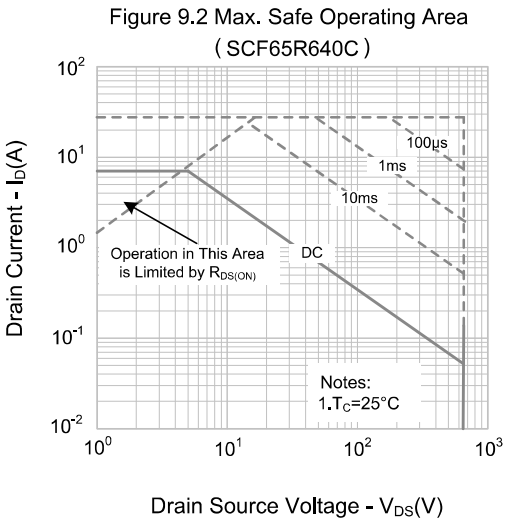
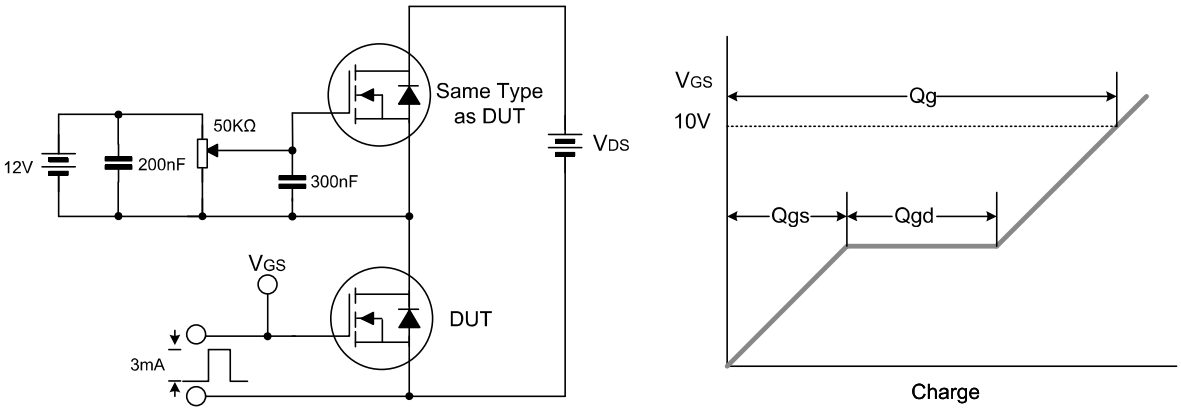


Figure 9.2 Max. Safe Operating Area (SCF65R640C)

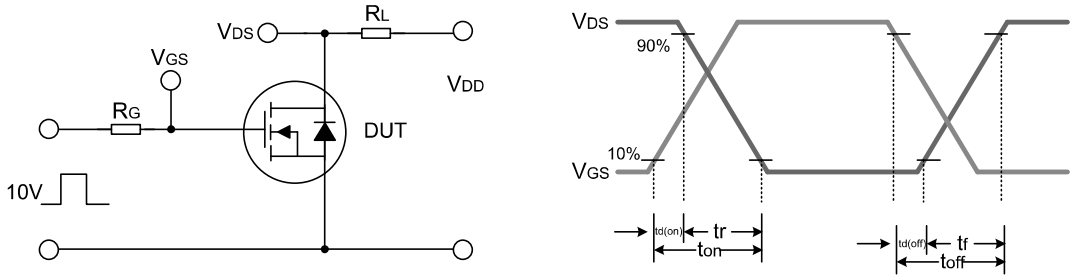


Test Circuit

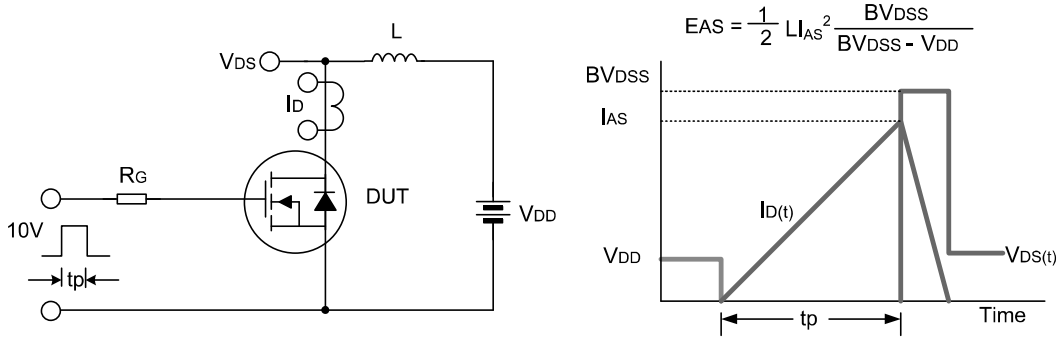
Gate Charge Test Circuit & Waveform



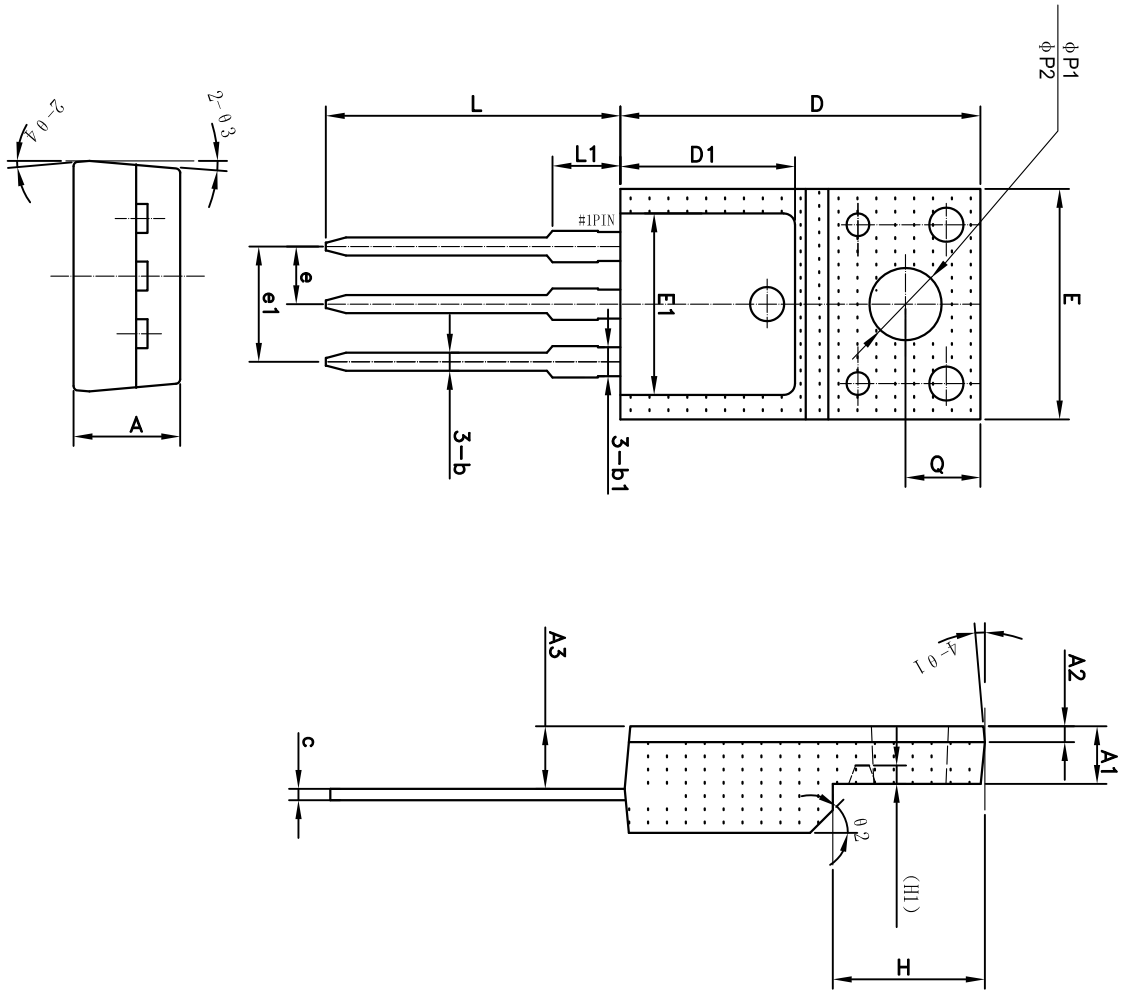
Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



Package Dimensions of TO-220F



Symbol	Dechanical Dimension(mm)		
	Min	Typ	Max
A	4.50	4.70	4.90
A1	2.44	2.54	2.64
A2	0.60	0.70	0.80
A3	2.56	2.76	2.96
b	0.70	0.80	0.95
b1		1.28	
c	0.45	0.50	0.65
D	15.67	15.87	16.07
D1		7.70	
E	9.96	10.16	10.36
E1		8.00	
e		2.54	
e1		5.08	
H	6.50	6.70	6.90
(H1)		(0.81)	
L	12.48	12.98	13.20
L1		2.93	
ϕP1	2.98	3.18	3.38
ϕP2	3.20	3.40	3.60
Q	3.10	3.30	3.50
θ1		5°	
θ2		45°	
θ3		5°	
θ4		5°	