

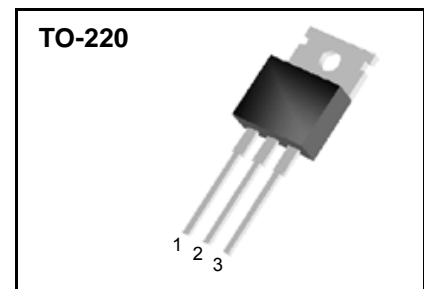
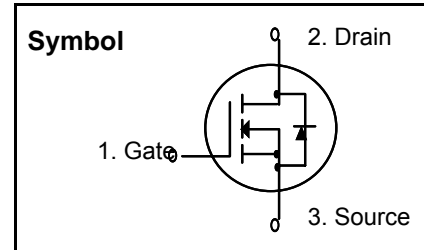
N-Channel MOSFET

Features

- $R_{DS(on)}$ (Max 0.18 Ω)@ $V_{GS}=10V$
- Gate Charge (Typical 45nC)
- Improved dv/dt Capability, High Ruggedness
- 100% Avalanche Tested
- Maximum Junction Temperature Range (150°C)

General Description

This Power MOSFET is produced using Semiwell's advanced planar stripe, DMOS technology. This latest technology has been especially designed to minimize on-state resistance, have a high rugged avalanche characteristics. These devices are well suited for high efficiency switching DC/DC converters, switch mode power supply, DC-AC converters for uninterrupted power supply, motor control.



Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{DSS}	Drain to Source Voltage	200	V
I_D	Continuous Drain Current(@ $T_C = 25^\circ C$)	18	A
	Continuous Drain Current(@ $T_C = 100^\circ C$)	11.4	A
I_{DM}	Drain Current Pulsed (Note 1)	72	A
V_{GS}	Gate to Source Voltage	± 25	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	250	mJ
E_{AR}	Repetitive Avalanche Energy (Note 1)	13.9	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5.5	V/ns
P_D	Total Power Dissipation(@ $T_C = 25^\circ C$)	139	W
	Derating Factor above 25 °C	1.11	W/°C
T_{STG}, T_J	Operating Junction Temperature & Storage Temperature	- 55 ~ 150	°C
T_L	Maximum Lead Temperature for soldering purpose, 1/8 from Case for 5 seconds.	300	°C

Thermal Characteristics

Symbol	Parameter	Value			Units
		Min.	Typ.	Max.	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	-	-	0.90	°C/W
$R_{\theta CS}$	Thermal Resistance, Case to Sink	-	0.5	-	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	-	-	62.5	°C/W

SFP640

Electrical Characteristics

$T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	200	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$, Referenced to 25°C	--	0.20	--	$\text{V}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 200\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	μA
		$V_{DS} = 160\text{ V}, T_C = 125^\circ\text{C}$	--	--	10	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 25\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -25\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2.0	--	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 9.0\text{ A}$	--	0.155	0.18	Ω
g_{FS}	Forward Transconductance	$V_{DS} = 40\text{ V}, I_D = 9.0\text{ A}$ (Note 4)	--	13	--	S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	1130	1470	pF
C_{oss}	Output Capacitance		--	225	290	pF
C_{rss}	Reverse Transfer Capacitance		--	80	105	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 100\text{ V}, I_D = 18\text{ A},$ $R_G = 25\ \Omega$	--	21	55	ns
t_r	Turn-On Rise Time		--	180	370	ns
$t_{d(off)}$	Turn-Off Delay Time		--	110	230	ns
t_f	Turn-Off Fall Time		(Note 4, 5)	--	100	210
Q_g	Total Gate Charge	$V_{DS} = 160\text{ V}, I_D = 18\text{ A},$ $V_{GS} = 10\text{ V}$	--	45	58	nC
Q_{gs}	Gate-Source Charge		--	8	--	nC
Q_{gd}	Gate-Drain Charge		(Note 4, 5)	--	22	--

Drain-Source Diode Characteristics and Maximum Ratings

I_S	Maximum Continuous Drain-Source Diode Forward Current	--	--	18	A	
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current	--	--	72	A	
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 18\text{ A}$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = 18\text{ A},$ $di_F / dt = 100\text{ A}/\mu\text{s}$ (Note 4)	--	160	--	ns
Q_{rr}	Reverse Recovery Charge		--	0.79	--	μC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $L = 1.16\text{ mH}, I_{AS} = 18\text{ A}, V_{DD} = 50\text{ V}, R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq 18\text{ A}, di/dt \leq 300\ \mu\text{A}/\text{s}, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse width $\leq 300\ \mu\text{s}$, Duty cycle $\leq 2\%$
5. Essentially independent of operating temperature

Typical Characteristics

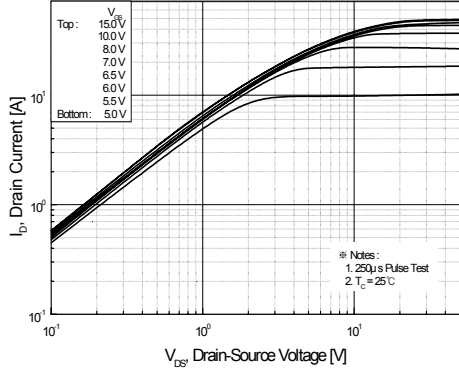


Figure 1. On-Region Characteristics

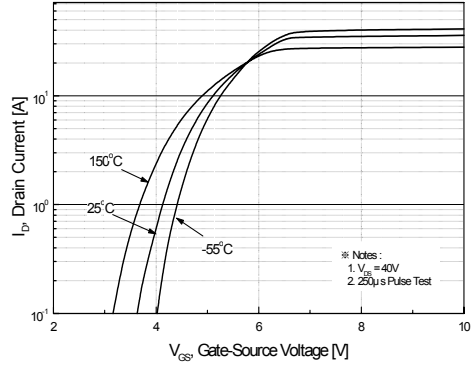


Figure 2. Transfer Characteristics

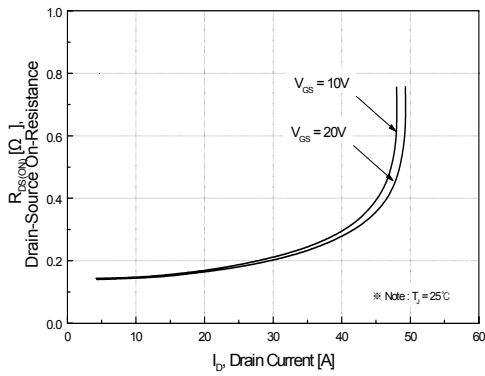


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

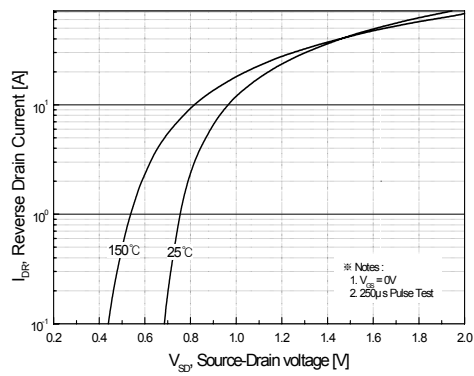


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

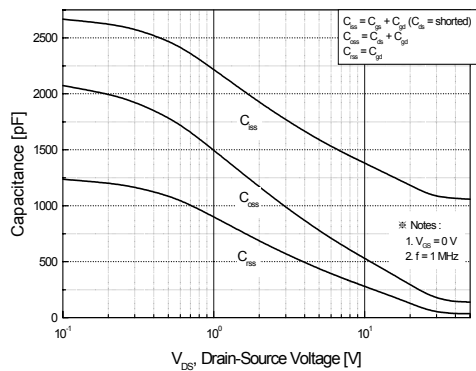


Figure 5. Capacitance Characteristics

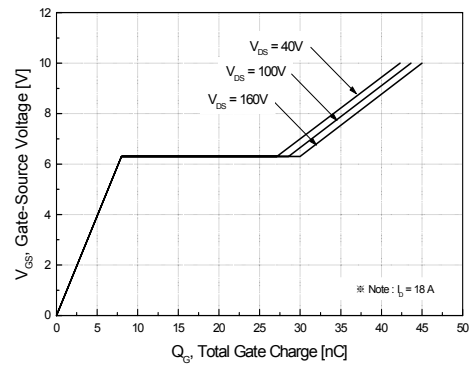


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

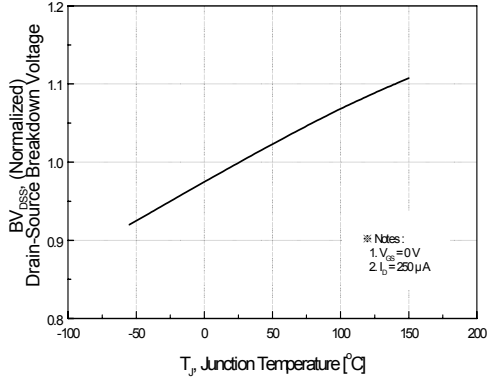


Figure 7. Breakdown Voltage Variation vs Temperature

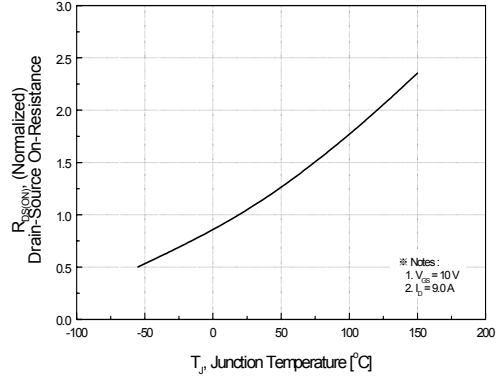


Figure 8. On-Resistance Variation vs Temperature

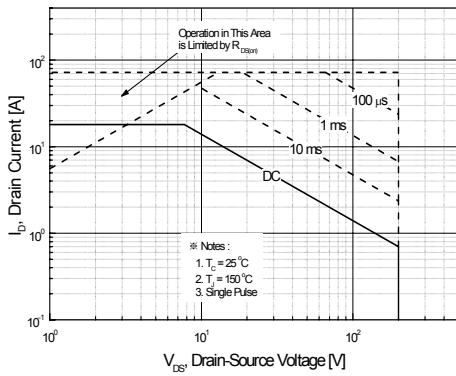


Figure 9. Maximum Safe Operating Area

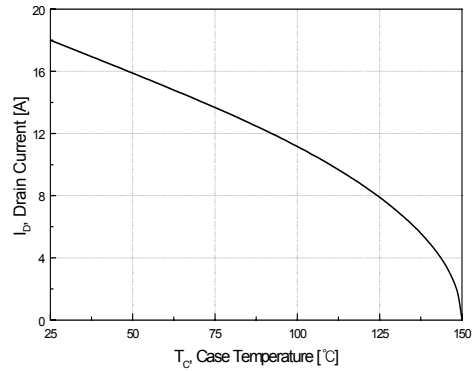


Figure 10. Maximum Drain Current vs Case Temperature

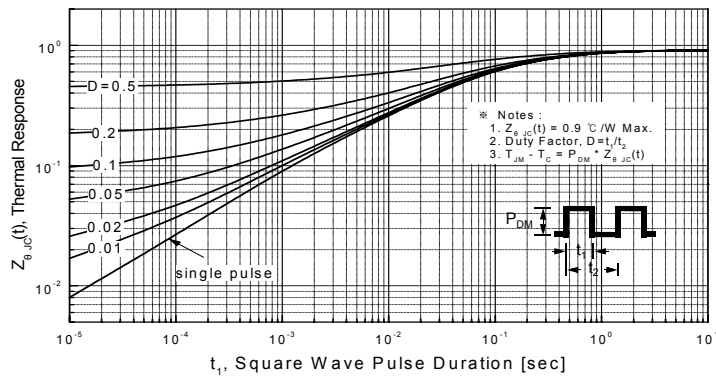
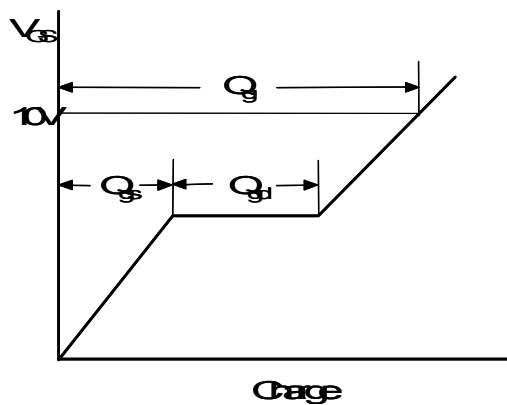
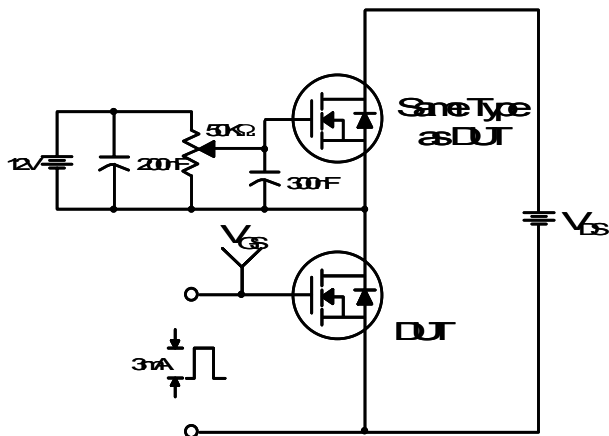
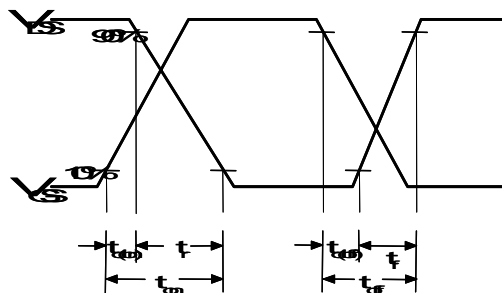
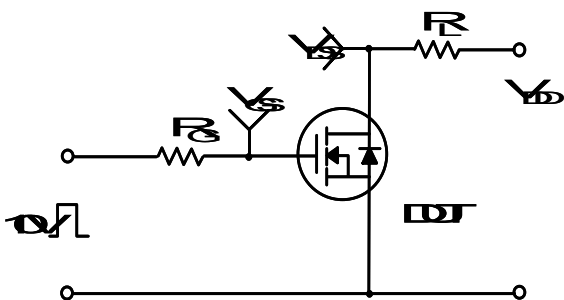


Figure 11. Transient Thermal Response Curve

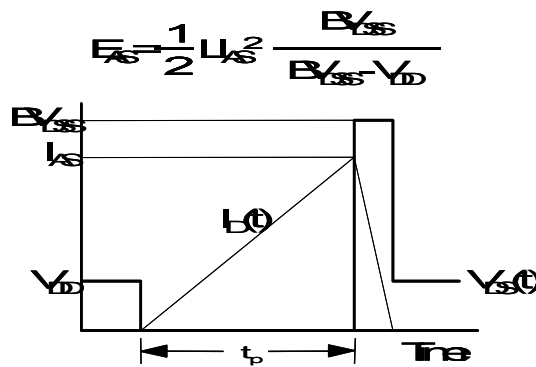
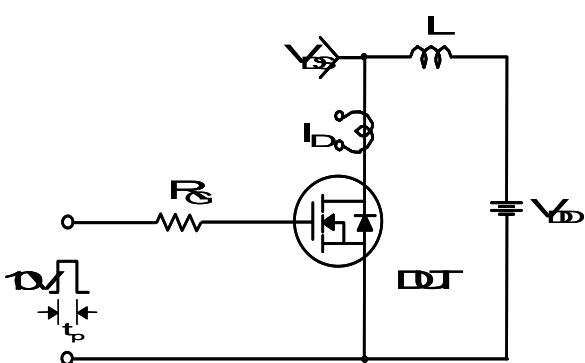
Gate Charge Test Circuit & Waveform



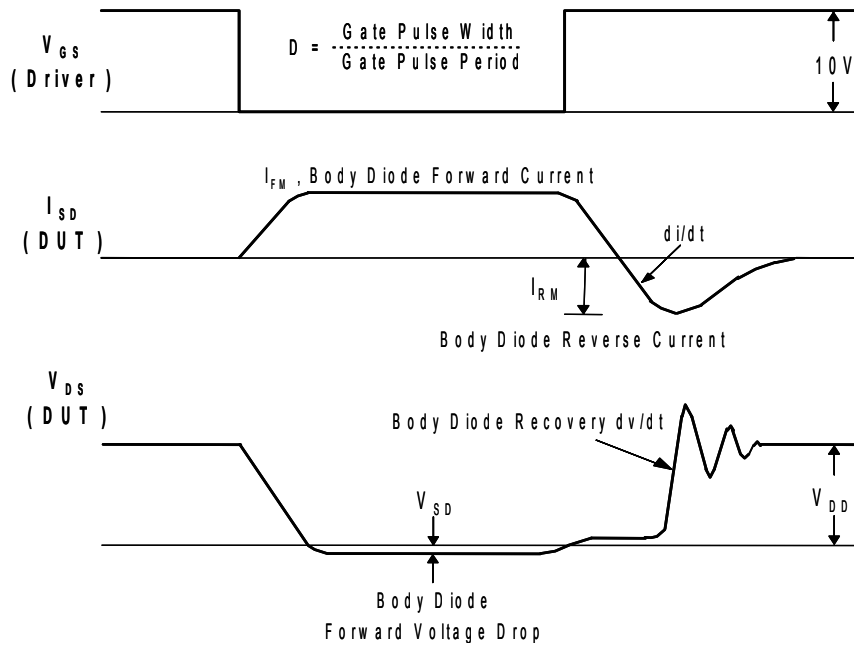
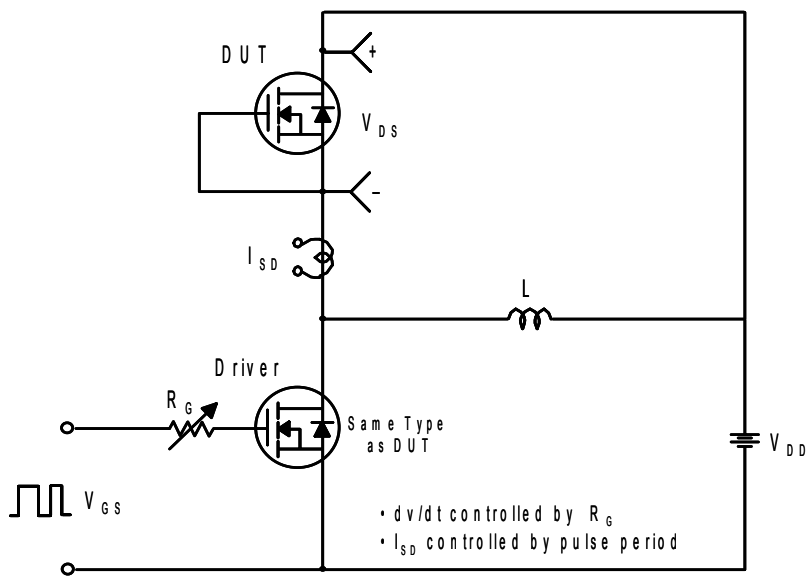
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms



TO-220 Package Dimension

Dim.	mm			Inch		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	9.7		10.1	0.382		0.398
B	6.3		6.7	0.248		0.264
C	9.0		9.47	0.354		0.373
D	12.8		13.3	0.504		0.524
E	1.2		1.4	0.047		0.055
F		1.7			0.067	
G		2.5			0.098	
H	3.0		3.4	0.118		0.134
I	1.25		1.4	0.049		0.055
J	2.4		2.7	0.094		0.106
K	5.0		5.15	0.197		0.203
L	2.2		2.6	0.087		0.102
M	1.25		1.55	0.049		0.061
N	0.45		0.6	0.018		0.024
O	0.6		1.0	0.024		0.039
ϕ		3.6			0.142	

