

N-Channel Power MOSFET

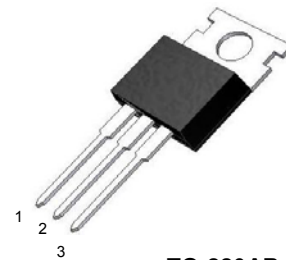
50A, 60V, 0.023Ω

GENERAL DESCRIPTION

This N-Channel MOSFET is used an advanced termination scheme to provide enhanced voltage-blocking capability without degrading performance over time. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance. This device is well suited for high efficiency switched mode power suppliers, active power factor correction, electronic lamp ballasts based half bridge topology.

FEATURES

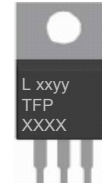
- Avalanche energy specified
- Gate Charge (Typical 36nC)
- High Ruggedness



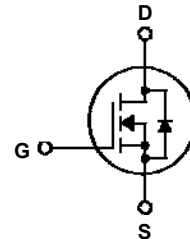
1 = Gate
2 = Drain
3 = Source

TO-220AB

DEVICE MARKING DIAGRAM



L = Tak Cheong Logo
xxyy = Monthly Date Code
TFPXXXX = Device Type



ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise noted)

Symbol	Parameter	Value	Units
V _{DSS}	Drain- Source Voltage	60	V
V _{GSS}	Gate-Source Voltage	± 25	V
I _D	Drain Current	50	A
I _{DM}	Drain Current Pulsed	200	A
P _D	Power Dissipation (Note 2)	120	W
	Derating Factor above 25°C	0.8	W/°C
E _{AS}	Single Pulsed Avalanche Energy (Note 1)	642	mJ
E _{AR}	Repetitive Avalanche Energy (Note 2)	12	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	7.0	V/ns
T _J	Operating Junction Temperature	150	°C
T _{stg}	Storage Temperature Range	- 55 to +150	°C

Notes:

1. L=300uH, I_{AS}=50A, V_{DD}=25V, R_G=50 Ω, Starting T_J=25°C.
2. Repetitive Rating: Pulse width limited by maximum junction temperature.
3. I_{SD} ≤ 50A, di/dt ≤ 300A/us, V_{DD} ≤ BV_{DSS}, Starting T_J=25°C.

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
R _{θJC}	Thermal Resistance, Junction-to-Case	1.25	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	62.5	°C/W

ELECTRICAL CHARACTERISTICS
Off Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	60	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 60V, V_{GS} = 0V$	--	--	1	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 25V, V_{DS} = 0V$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -25V, V_{DS} = 0V$	--	--	-100	nA

On Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	--	4.0	V
$R_{DS(on)}$	On-Resistance	$V_{GS} = 10V, I_D = 25A$	--	0.017	0.023	Ω

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0\text{MHz}$	--	---	1460	pF
C_{oss}	Output Capacitance		--	---	580	pF
C_{rss}	Reverse Transfer Capacitance		--	---	90	pF

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 30V, I_D = 25A,$ $R_G = 25\Omega$ (Note 4 & 5)	--	50	--	nS
t_r	Turn-On Rise Time		--	165	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	78	--	nS
t_r	Turn-Off Fall Time		--	60	--	nS
Q_g	Total Gate Charge	$V_{DS} = 160V, I_D = 8.0A,$	--	36	45	nC
Q_{gs}	Gate-Source Charge	$V_{GS} = 10V$	--	8.5	--	nC
Q_{gd}	Gate-Drain Charge	(Note 4 & 5)	--	12	--	nC

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Drain-Source Current	Integral Reverse p-n Junction Diode in the MOSFET	--	--	50	A
I_{SM}	Pulsed Drain-Source Current		--	--	200	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_S = 50A$	--	--	1.5	V
T_{rr}	Reverse Recovery Time	$V_{GS} = 0V, I_S = 50A,$ $di_F / dt = 100A/\mu S$	--	95	--	nS
Q_{rr}	Reverse Recovery Charge	(Note 4)	--	250	--	μC

Notes:

- Pulse Test: Pulse width < 300 μs , Duty cycle $\leq 2\%$.
- Basically not affected by working temperature.

TYPICAL CHARACTERISTICS

Fig 1. On-State Characteristics

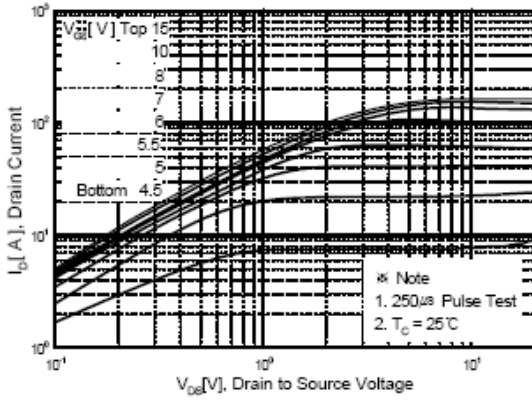


Fig 2. Transfer Characteristics

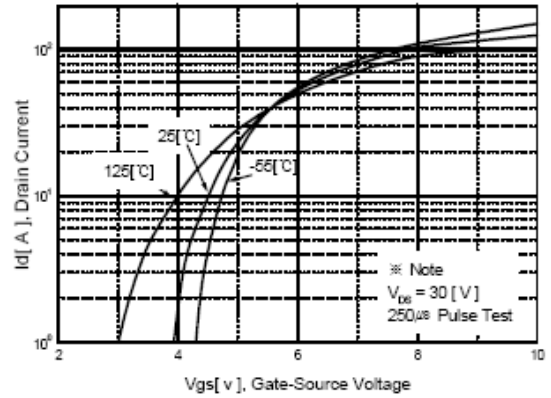


Fig 3. On Resistance Variation vs. Drain Current and Gate Voltage

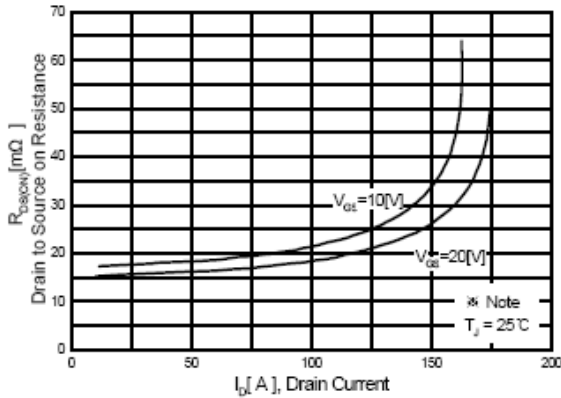


Fig 4. On State Current vs. Allowable Case Temperature

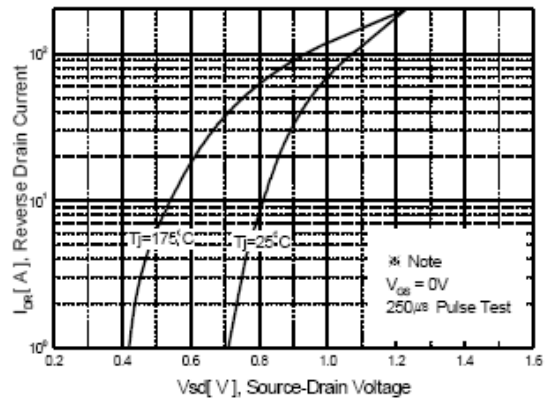


Fig 5. Capacitance Characteristics

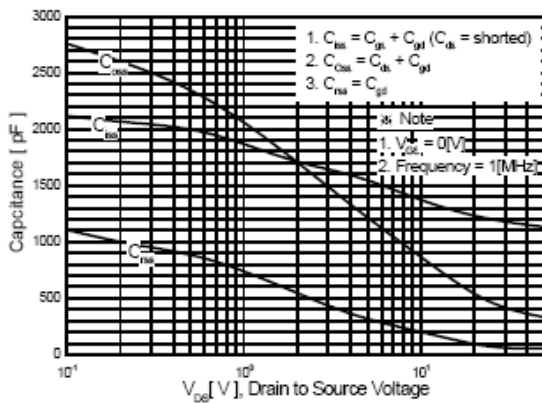


Fig 6. Gate Charge Characteristics

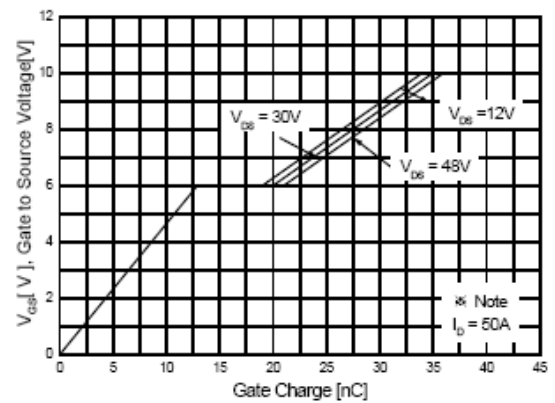


Fig 7. Breakdown Voltage variation vs. Temperature

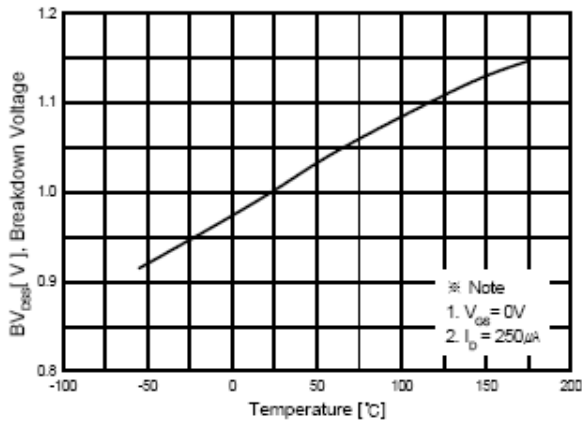


Fig 8. On Resistance variation vs. Temperature

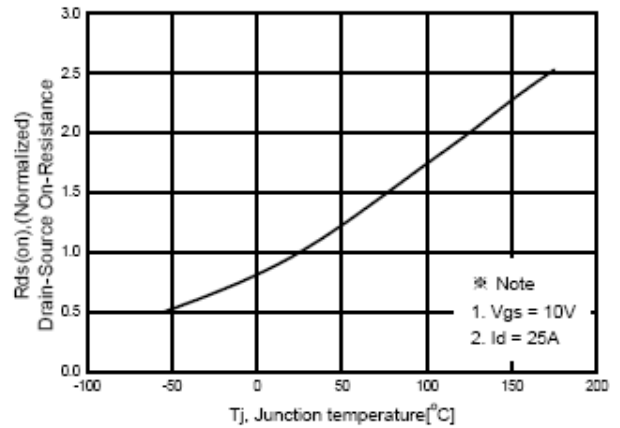


Fig 9. Maximum Safe Operating Area

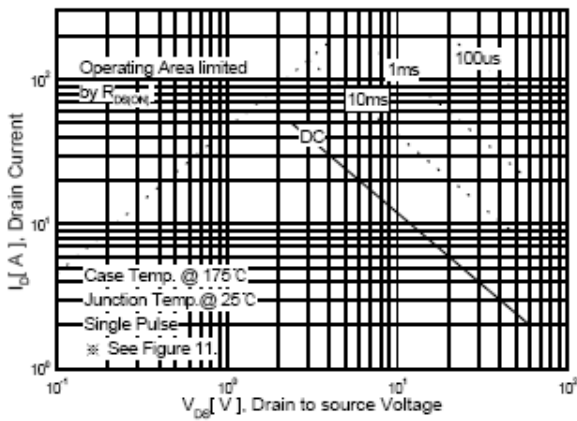


Fig 10. Maximum Drain Current vs. Case Temperature

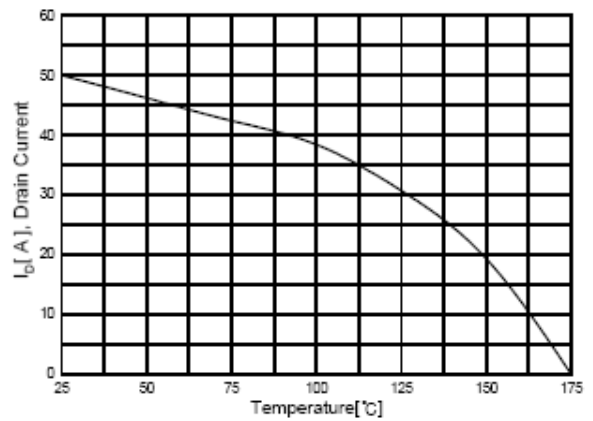


Fig 11. Transient Thermal Response Curve

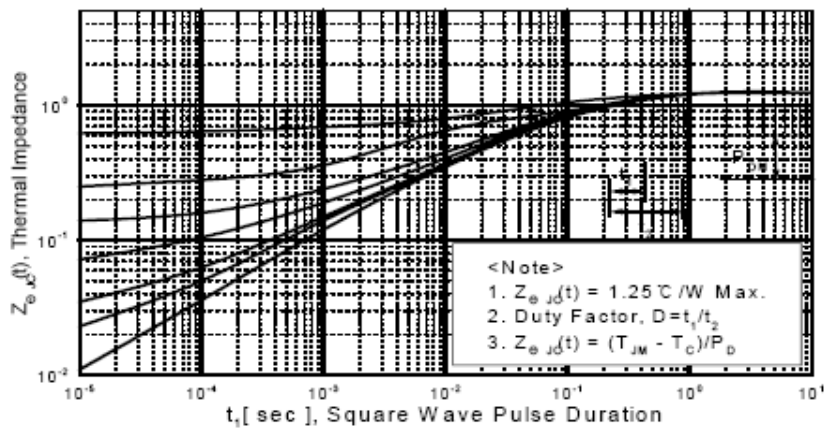


Fig. 12. Gate Charge Test Circuit & Waveforms

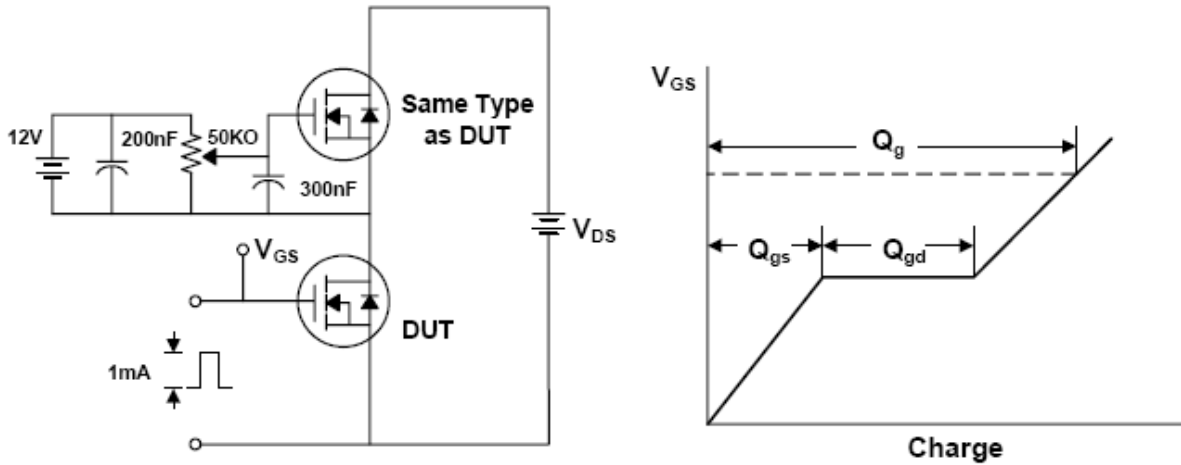


Fig 13. Switching Time Test Circuit & Waveforms

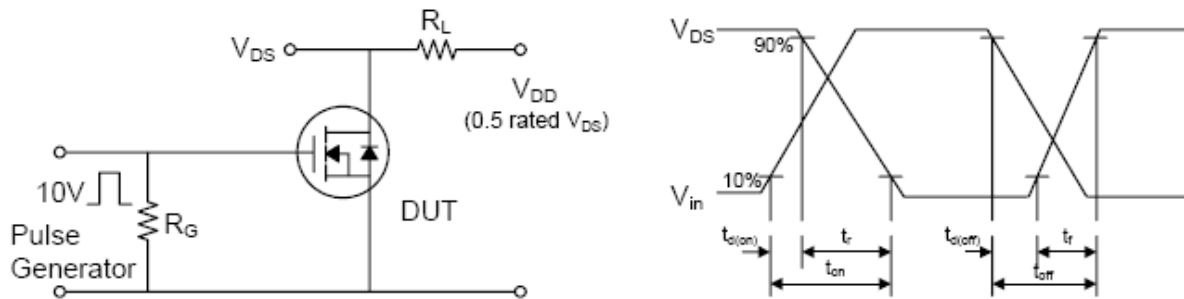


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

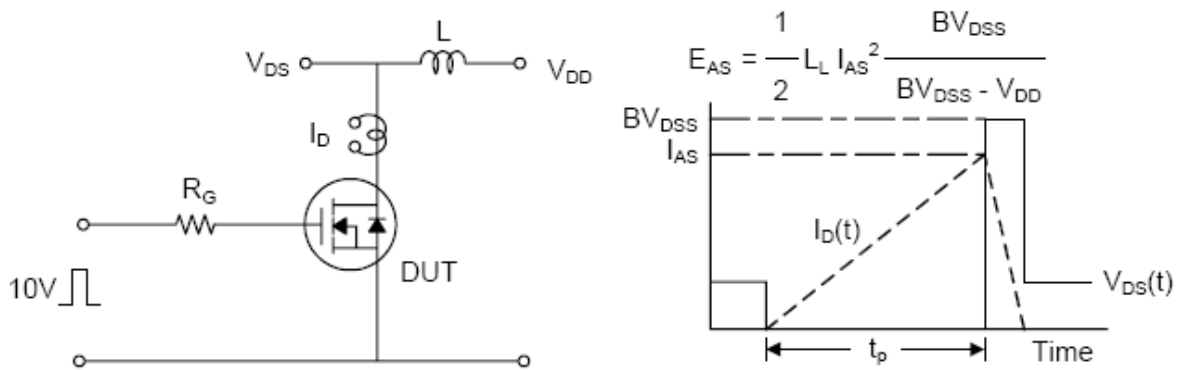
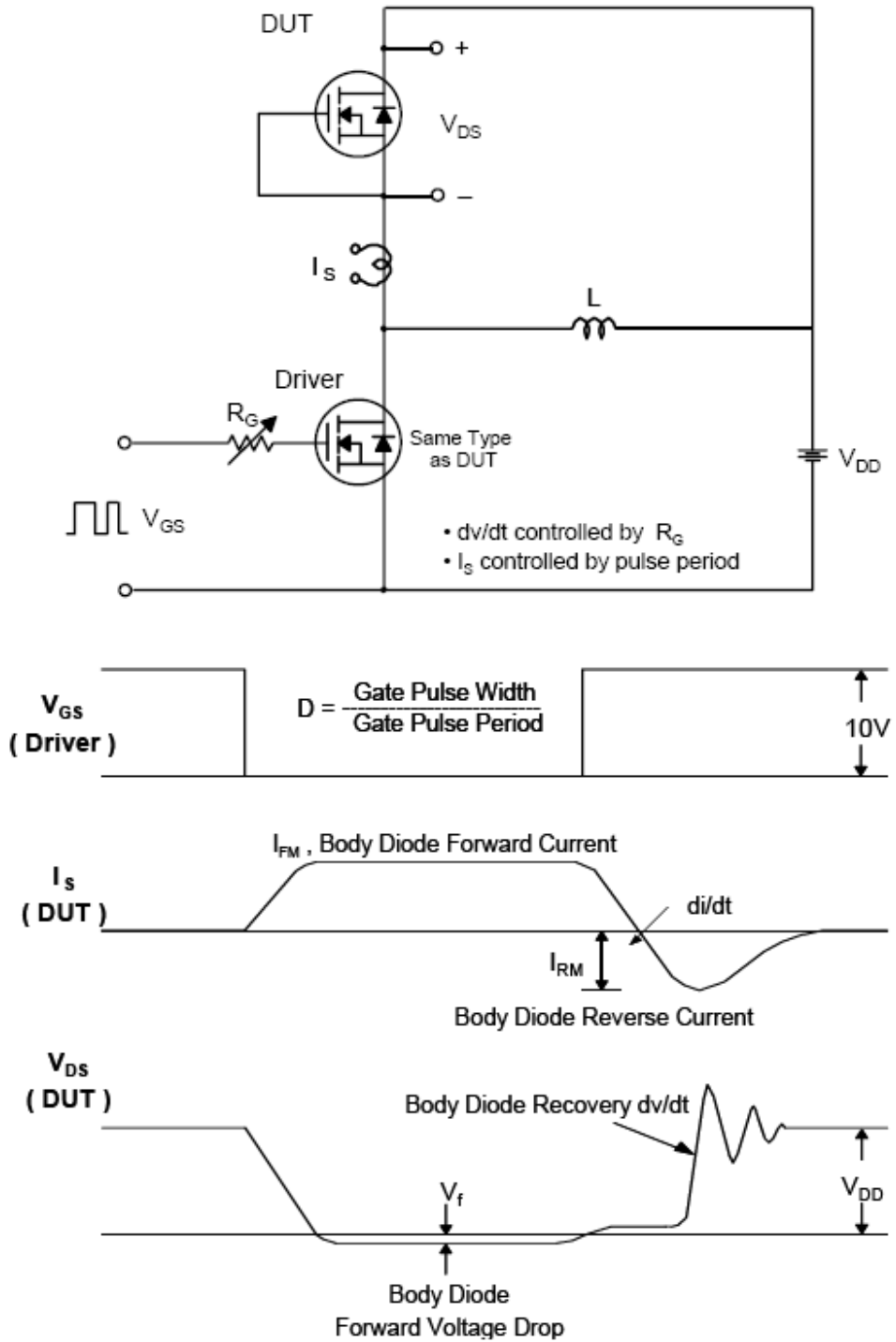
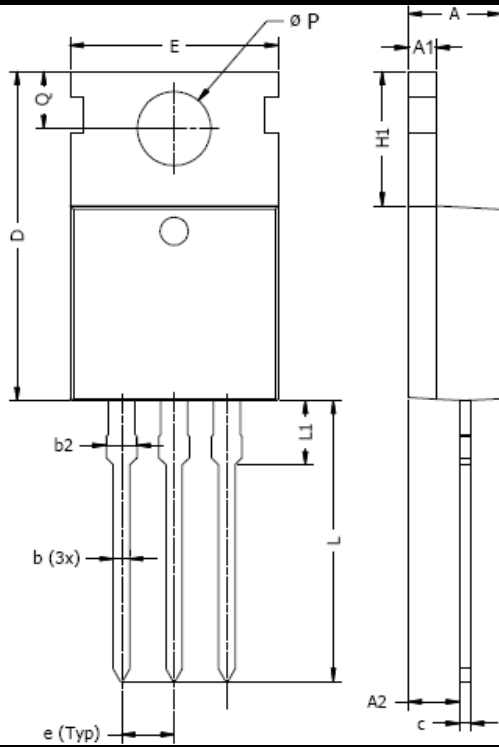


Fig. 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



TO220AB PACKAGE OUTLINE



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	3.60	4.80	0.142	0.189
A1	1.20	1.40	0.047	0.055
A2	2.03	2.90	0.080	0.114
b	0.40	1.00	0.016	0.039
b2	1.20	1.78	0.047	0.070
c	0.36	0.60	0.014	0.024
D	14.22	16.50	0.560	0.650
e	2.34	2.74	0.092	0.108
E	9.70	10.60	0.382	0.417
H1	5.84	6.85	0.230	0.270
L	12.70	14.70	0.500	0.579
L1	2.70	3.30	0.106	0.130
$\varnothing P$	3.50	4.00	0.138	0.157
Q	2.54	3.40	0.100	0.134

NOTE: Above package outline conforms to JEDEC TO-220AB

N-Channel Power MOSFET

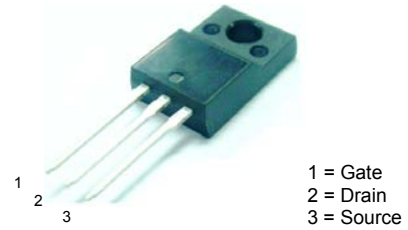
28A, 60V, 0.023Ω

GENERAL DESCRIPTION

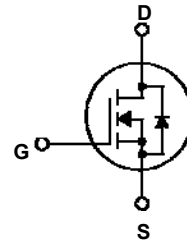
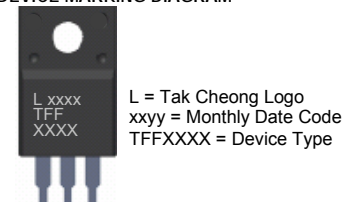
The N-Channel MOSFET is used an advanced termination scheme to provide enhanced voltage-blocking capability without degrading performance over time. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance. This device is well suited for high efficiency switched mode power suppliers, active power factor correction, electronic lamp ballasts based half bridge topology.

FEATURES

- Avalanche energy specified
- Gate Charge (Typical 36nC)
- High Ruggedness.



TO-220FP
DEVICE MARKING DIAGRAM



ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise noted)

Symbol	Parameter	Value	Units
V _{DSS}	Drain- Source Voltage	60	V
V _{GSS}	Gate-Source Voltage	±25	V
I _D	Drain Current	28	A
I _{DM}	Drain Current Pulsed	112	A
P _D	Power Dissipation (Note 2)	47	W
	Derating Factor above 25°C	0.31	W/°C
E _{AS}	Single Pulsed Avalanche Energy (Note 1)	643	mJ
E _{AR}	Repetitive Avalanche Energy (Note 2)	4.7	mJ
dv/dt	Peak Diode Recovery dv/dt	7.0	V/ns
T _J	Operating Junction Temperature	150	°C
T _{stg}	Storage Temperature Range	- 55 to +150	°C

Notes:

1. L=300uH, I_{AS}=50A, V_{DD}=25V, R_G=50 Ω, Starting T_J=25°C
2. Repetitive Rating: Pulse width limited by maximum junction temperature.
3. I_{SD} ≤ 50A, di/dt ≤ 300A/us, V_{DD} ≤ BV_{DSS}, Starting T_J=25°C

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
R _{θJC}	Thermal Resistance, Junction-to-Case	3.22	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	62.5	°C/W

ELECTRICAL CHARACTERISTICS
Off Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	60	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 600V, V_{GS} = 0V$	--	--	1	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 25V, V_{DS} = 0V$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -25V, V_{DS} = 0V$	--	--	-100	nA

On Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	--	4.0	V
$R_{DS(ON)}$	On-Resistance	$V_{GS} = 10V, I_D = 25A$	--	0.017	0.023	Ω

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0\text{MHz}$	--	--	1460	pF
C_{oss}	Output Capacitance		--	--	580	pF
C_{rss}	Reverse Transfer Capacitance		--	--	90	pF

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 30V, I_D = 25A,$ $R_G = 25\Omega$ (Note 4 & 5)	--	50	--	nS
t_r	Turn-On Rise Time		--	165	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	78	--	nS
t_f	Turn-Off Fall Time		--	60	--	nS
Q_g	Total Gate Charge	$V_{DS} = 160V, I_D = 50A,$	--	36	45	nC
Q_{gs}	Gate-Source Charge	$V_{GS} = 10V$	--	8.5	--	nC
Q_{gd}	Gate-Drain Charge	(Note 4 & 5)	--	12	--	nC

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Drain-Source Current	Integral Reverse p-n Junction Diode in the MOSFET	--	--	28	A
I_{SM}	Pulsed Drain-Source Current		--	--	112	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_S = 50A$	--	--	1.5	V
T_{rr}	Reverse Recovery Time	$V_{GS} = 0V, I_S = 50A,$ $dI_F / dt = 100A/\mu S$	--	95	--	nS
Q_{rr}	Reverse Recovery Charge	(Note 4)	--	250	--	μC

Notes:

- Pulse Test: Pulse width < 300 μs , Duty cycle $\leq 2\%$.
- Basically not affected by working temperature.

TYPICAL CHARACTERISTICS

Fig 1. On-State Characteristics

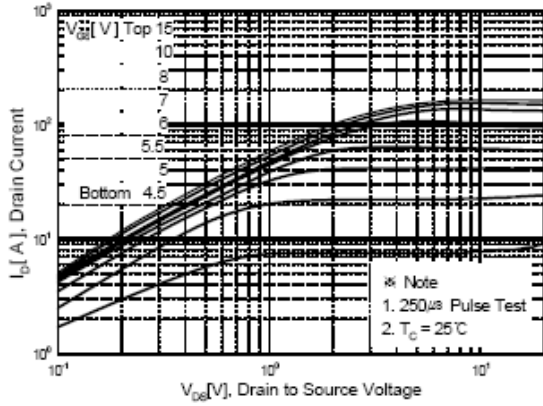


Fig 2. Transfer Characteristics

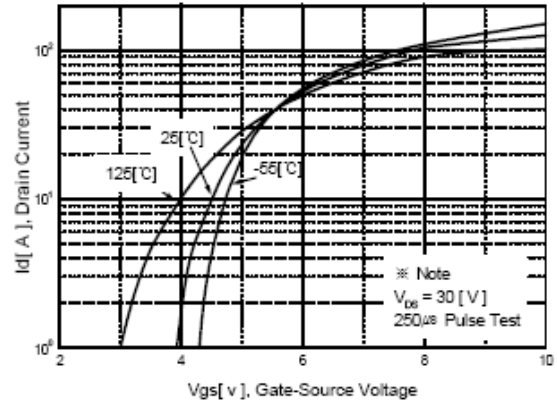


Fig 3. On Resistance Variation vs. Drain Current and Gate Voltage

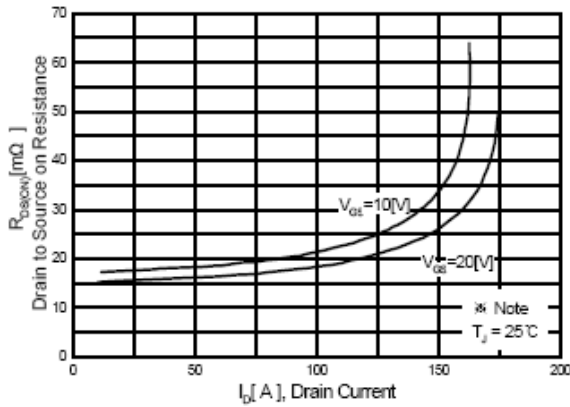


Fig 4. On State Current vs. Allowable Case Temperature

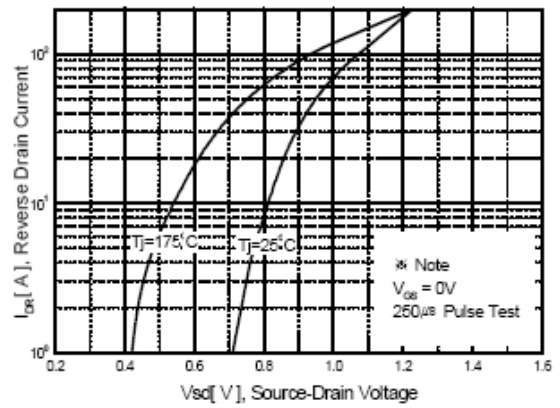


Fig 5. Capacitance Characteristics

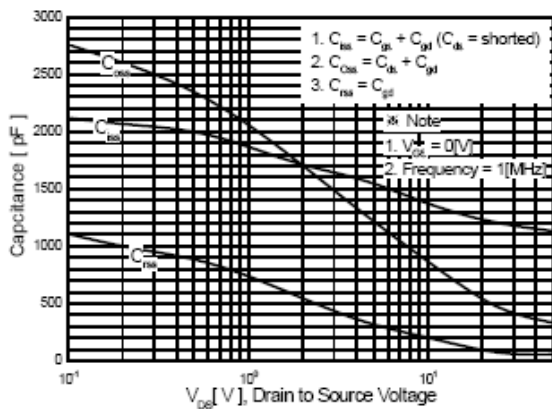


Fig 6. Gate Charge Characteristics

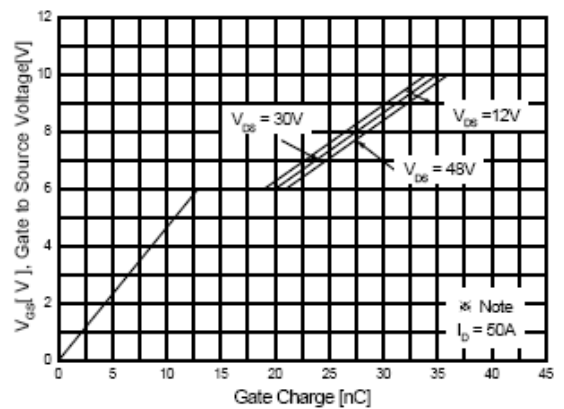


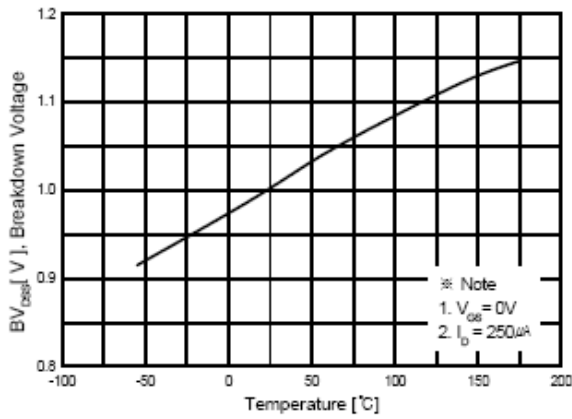
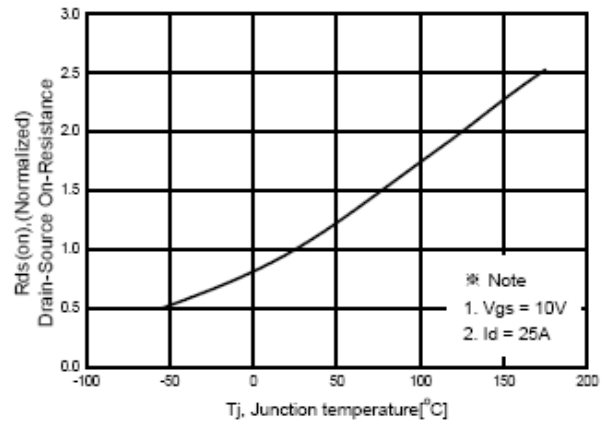
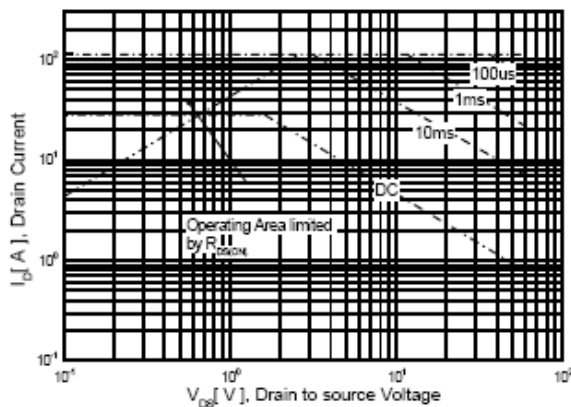
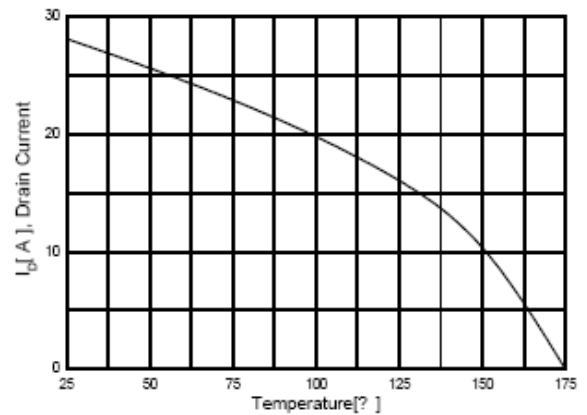
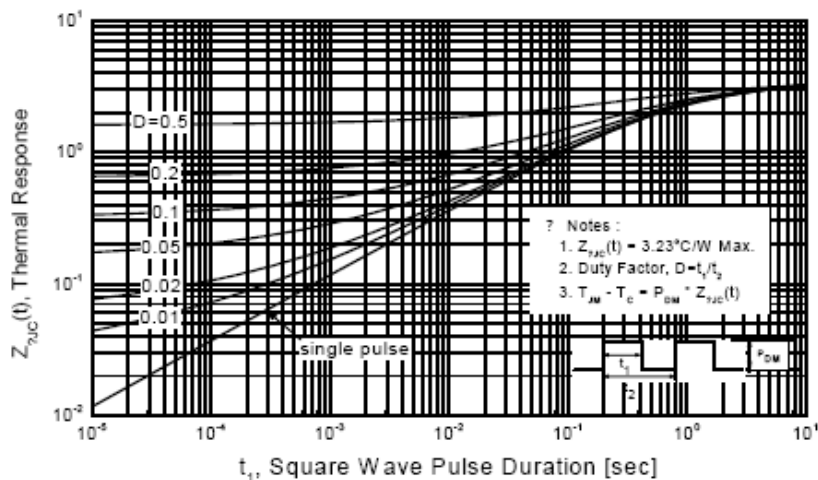
Fig 7. Breakdown Voltage variation vs. Temperature

Fig 8. On Resistance variation vs. Temperature

Fig 9. Maximum Safe Operating Area

Fig 10. Maximum Drain Current vs. Case Temperature

Fig 11. Transient Thermal Response Curve


Fig. 12. Gate Charge Test Circuit & Waveforms

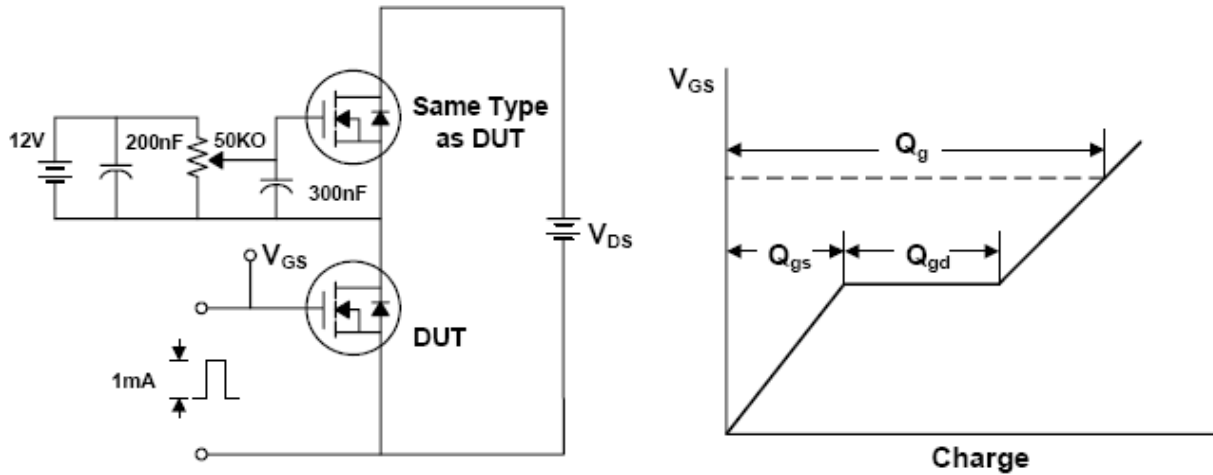


Fig 13. Switching Time Test Circuit & Waveforms

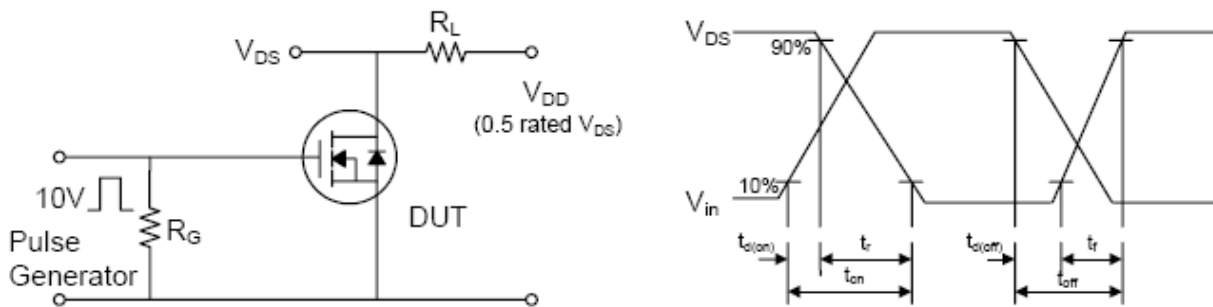


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

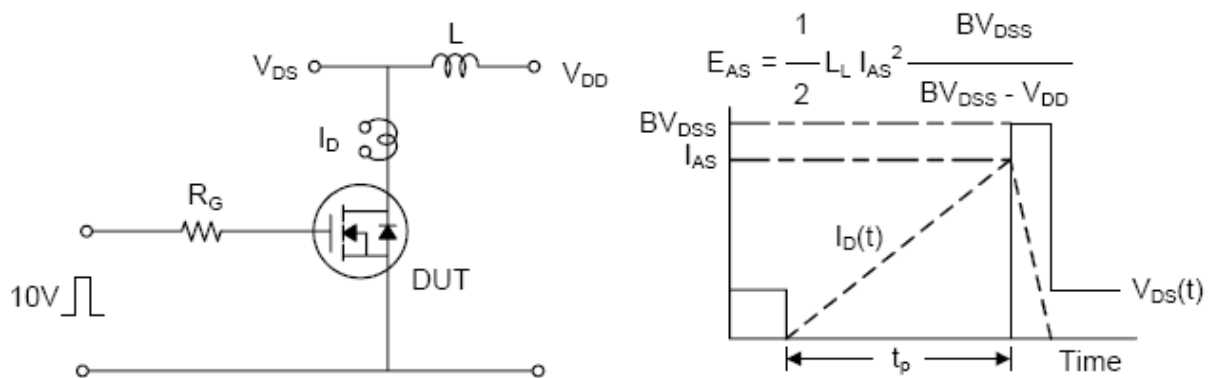
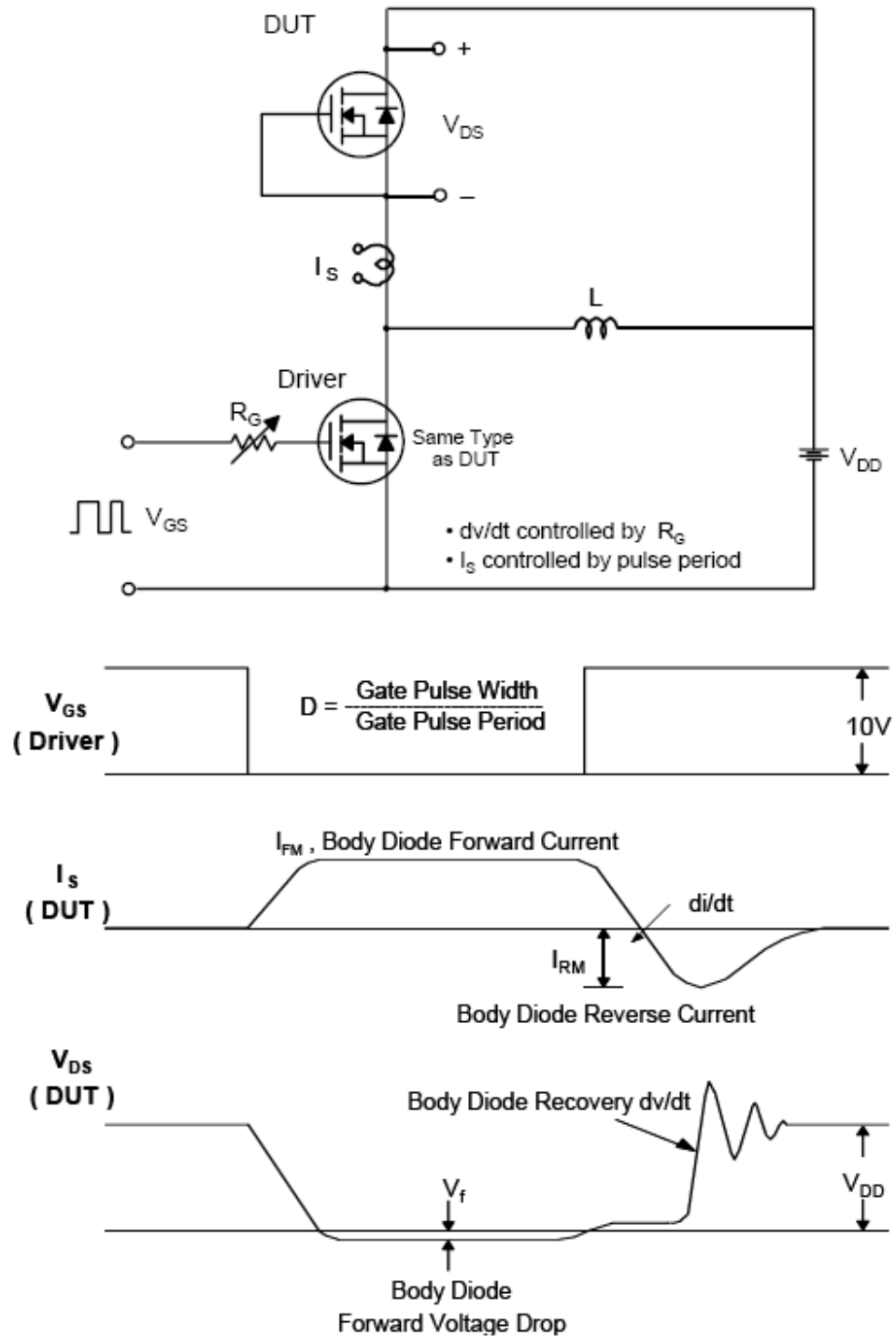
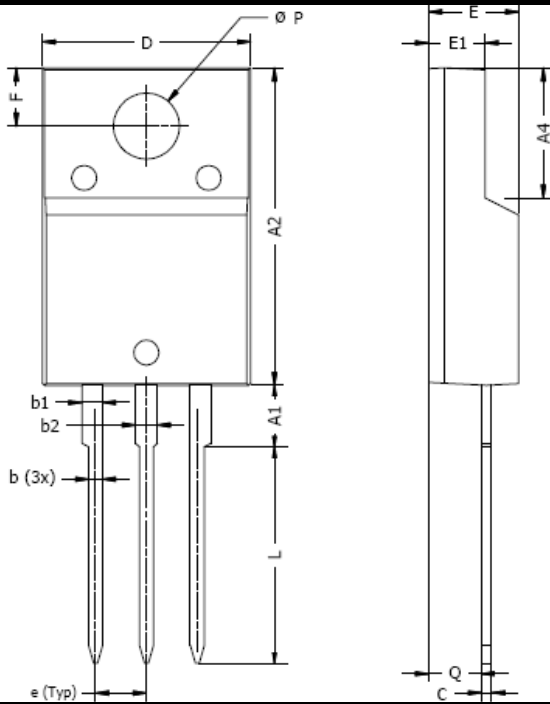


Fig. 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



TO220F PACKAGE OUTLINE


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A1	2.7	3.3	0.106	0.130
A2	15.0	15.7	0.591	0.618
A4	6.2	6.6	0.244	0.260
b	0.5	0.9	0.020	0.035
b1	0.9	1.2	0.035	0.047
b2	1.0	1.2	0.039	0.047
c	0.4	0.6	0.016	0.024
D	9.8	10.3	0.386	0.406
e	2.34	2.74	0.092	0.108
E	4.3	4.6	0.169	0.181
E1	2.5	2.9	0.098	0.114
F	2.6	3.0	0.102	0.118
L	10.3	10.7	0.406	0.421
$\varnothing P$	3.0	3.4	0.118	0.134
Q	2.3	2.7	0.091	0.106

Note: Single Gauge

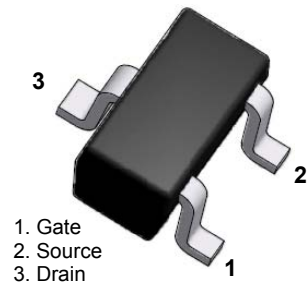
**150mW SOT-523 SURFACE MOUNT
Plastic Package
N-Channel MOSFET**

Green Product

Absolute Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Value	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Continuous Gate-Source Voltage	$\pm 20\text{V}$	V
I_D	Continuous Drain Current	115	mA
P_D	Power Dissipation	150	mW
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	833	$^\circ\text{C}/\text{W}$
T_{STG}	Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_J	Operating Junction Temperature	+150	$^\circ\text{C}$

These ratings are limiting values above which the serviceability of the device may be impaired.



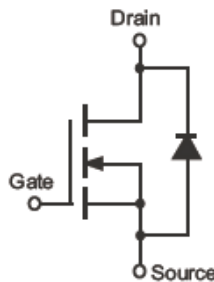
SOT-523

2N7002T

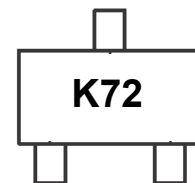
Specification Features:

- Low On-resistance
- Low Gate Threshold Voltage
- Low Input capacitance
- RoHS Compliant
- Green EMC
- Matte Tin(Sn) Lead Finish
- Weight: approx. 0.002g

Electrical Symbol:



Device Marking Code:



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

Off Characteristics

Symbol	Parameter	Test Condition	Limits			Unit
			Min	Typ	Max	
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=10\mu A$	60			Volts
I_{GSS}	Gate-Body Leakage	$V_{DS}=0V, V_{GS}=\pm 20V$			± 1	μA
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=60V, V_{GS}=0V$			100	nA

On Characteristics

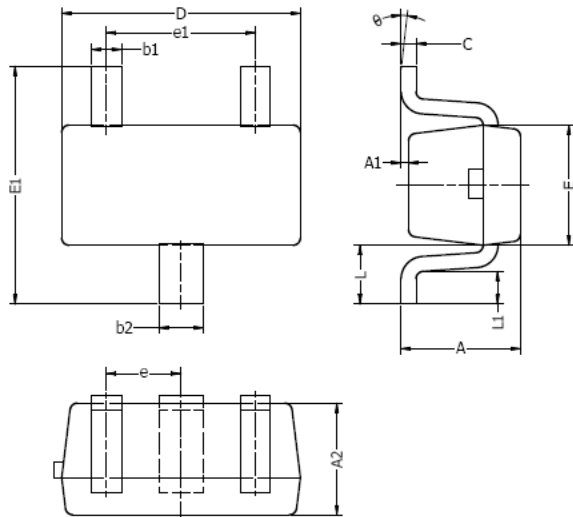
Symbol	Parameter	Test Condition	Limits			Unit
			Min	Typ	Max	
$V_{th(GS)}$	Gate-Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1			Volts
$I_{D(ON)}$	On-state Drain Current	$V_{GS}=10V, V_{DS}=7V$	500			mA
$R_{DS(on)}$	Drain-Source On-Resistance	$V_{GS}=10V, I_D=500mA$			7.5	Ω
		$V_{GS}=5V, I_D=50mA$			7.5	Ω
g_{fs}	Forward Trans Conductance	$V_{DS}=10V, I_D=200mA$	80		500	ms
$V_{DS(on)}$	Drain-Source On-Voltage	$V_{GS}=10V, I_D=500mA$			3.75	V
		$V_{GS}=5V, I_D=50mA$			0.375	V
V_{SD}	Diode Forward Voltage	$I_S=250mA, V_{GS}=0V$			1	V

Dynamic Characteristics

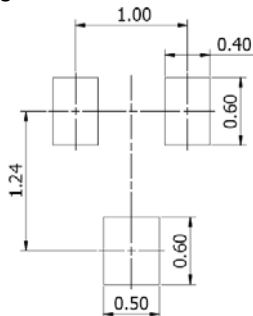
Symbol	Parameter	Test Condition	Limits			Unit
			Min	Typ	Max	
C_{iss}	Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0MHz$	--	--	50	pF
C_{oss}	Output Capacitance		--	--	25	pF
C_{rss}	Reverse Transfer Capacitance		--	--	5.0	pF

Switching Characteristics

Symbol	Parameter	Test Condition	Limits			Unit
			Min	Typ	Max	
$t_{D(on)}$	Turn-on Time	$V_{DD}=10V, R_L=20\Omega,$ $I_D=500mA, V_{GEN}=10V,$ $R_G = 10\Omega$	--	5.6	--	nS
$t_{D(off)}$	Turn-off Time		--	25	--	nS

SOT-523 Package Outline


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.70	0.90	0.028	0.035
A1	0.00	0.10	0.000	0.004
A2	0.70	0.80	0.028	0.031
b1	0.15	0.25	0.006	0.010
b2	0.25	0.35	0.010	0.014
c	0.10	0.20	0.004	0.008
D	1.50	1.70	0.059	0.067
E	0.70	0.90	0.028	0.035
E1	1.45	1.75	0.057	0.069
e	0.50 TYP.		0.020 TYP.	
e1	0.90	1.10	0.035	0.043
L	0.40 REF.		0.016 REF.	
L1	0.10	0.30	0.004	0.012
θ	0°	8°	0°	8°

Typical Soldering Pattern:

NOTES:

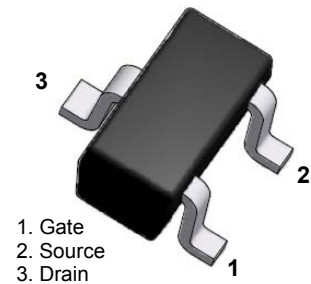
1. Above package outline conforms to JEITA EAIJ ED-7500A SC-75A.
2. Dimensions are exclusive of Burrs, Mold Flash & Tie Bar extrusions.

150mW SOT-523 SURFACE MOUNT
Plastic Package
N-Channel MOSFET

Green Product

Absolute Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Value	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Continuous Gate-Source Voltage	$\pm 20\text{V}$	V
I_D	Continuous Drain Current	100	mA
P_D	Power Dissipation	150	mW
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	833	$^\circ\text{C} / \text{W}$
T_{STG}	Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_J	Operating Junction Temperature	+150	$^\circ\text{C}$



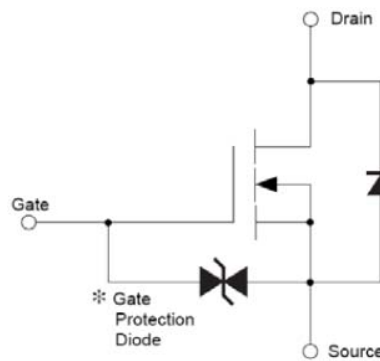
SOT-523

These ratings are limiting values above which the serviceability of the device may be impaired.

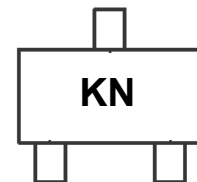
Specification Features:

- Low On-resistance
- Fast Switching Speed
- Low Voltage Drive Makes This Device Ideal for Portable Equipment
- Easily Designed Drive Circuits
- Easy to Parallel
- RoHS Compliant & Green EMC
- Matte Tin(Sn) Lead Finish
- Weight: approx. 0.002g

Electrical Symbol:



Device Marking Code:



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

Off Characteristics

Symbol	Parameter	Test Condition	Limits			Unit
			Min	Typ	Max	
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=10\mu A$	30			Volts
I_{GSS}	Gate-Body Leakage	$V_{DS}=0V, V_{GS}=\pm 20V$			± 1	μA
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=30V, V_{GS}=0V$			1	μA

On Characteristics

Symbol	Parameter	Test Condition	Limits			Unit
			Min	Typ	Max	
$V_{th(GS)}$	Gate-Threshold Voltage	$V_{DS}=3V, I_D=100\mu A$	0.8		1.5	Volts
$R_{DS(on)}$	Drain-Source On-Resistance	$V_{GS}=4V, I_D=10mA$			8	Ω
		$V_{GS}=2.5V, I_D=1mA$			13	Ω
g_{fs}	Forward Trans Conductance	$V_{DS}=3V, I_D=10mA$	20			ms
V_{SD}	Drain-Source Diode Forward Voltage	$I_S=115mA, V_{GS}=0V$			1.2	V

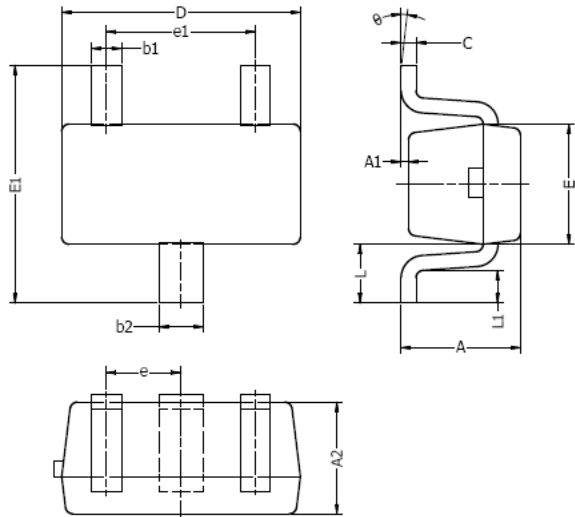
Dynamic Characteristics

Symbol	Parameter	Test Condition	Limits			Unit
			Min	Typ	Max	
C_{iss}	Input Capacitance	$V_{DS}=5V$ $V_{GS}=0V$ $f=1.0MHz$		13		pF
C_{oss}	Output Capacitance			9		pF
C_{rss}	Reverse Transfer Capacitance			4		pF

Switching Characteristics

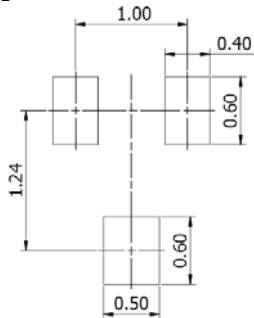
Symbol	Parameter	Test Condition	Limits			Unit
			Min	Typ	Max	
$t_{D(on)}$	Turn-on Time	$V_{DD}=5V, R_L=500\Omega,$ $I_D=10mA, V_{GS}=5V,$ $R_G=10\Omega$		15		nS
$t_{D(off)}$	Turn-off Time			80		nS

SOT-523 Package Outline



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.70	0.90	0.028	0.035
A1	0.00	0.10	0.000	0.004
A2	0.70	0.80	0.028	0.031
b1	0.15	0.25	0.006	0.010
b2	0.25	0.35	0.010	0.014
c	0.10	0.20	0.004	0.008
D	1.50	1.70	0.059	0.067
E	0.70	0.90	0.028	0.035
E1	1.45	1.75	0.057	0.069
e	0.50 TYP.		0.020 TYP.	
e1	0.90	1.10	0.035	0.043
L	0.40 REF.		0.016 REF.	
L1	0.10	0.30	0.004	0.012
θ	0°	8°	0°	8°

Typical Soldering Pattern:

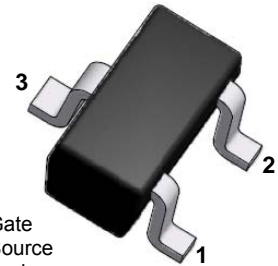


NOTES:

1. Above package outline conforms to JEITA EAIJ ED-7500A SC-75A.
2. Dimensions are exclusive of Burrs, Mold Flash & Tie Bar extrusions.

150mW SOT-523 SURFACE MOUNT
Plastic Package
N-Channel 1.8-V (G-S) MOSFET

Green Product



SOT-523

Absolute Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	5 secs	Steady State	Units	
V_{DS}	Drain-Source Voltage		20	V	
V_{GS}	Gate-Source Voltage		$\pm 6V$	V	
I_D	Continuous Drain Current ^e	$T_A=25^\circ\text{C}$	600	500	mA
		$T_A=85^\circ\text{C}$	400	350	
I_{DM}	Pulsed Drain Current ^d		1000	mA	
I_S	Continuous Source Current ^e	275	250	mA	
P_D	Power Dissipation ^e	$T_A=25^\circ\text{C}$	175	150	mW
		$T_A=85^\circ\text{C}$	90	80	
T_{STG}	Storage Temperature Range	-55 to +150		$^\circ\text{C}$	
T_J	Operating Junction Temperature	+150		$^\circ\text{C}$	
ESD	Gate-source ESD Rating (HBM, Method 3015)	2000		V	

These ratings are limiting values above which the serviceability of the device may be impaired.

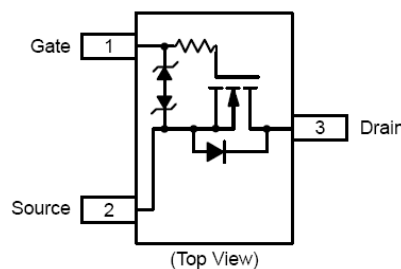
Notes:

- d. Pulse width limited by maximum junction temperature.
- e. Surface mounted on FR4 board.

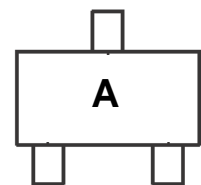
FEATURES

- TrenchFET[®] Power MOSFET: 1.8-V Rated
- Gate-Source ESD Protected: 2000V
- High-side Switching
- Low On-Resistance: 0.7 Ω
- Low Threshold: 0.8V (Typ.)
- Fast Switching Speed: 10ns
- S-Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- RoHS Compliant
- Green EMC
- Matte Tin(Sn) Lead Finish
- Weight: approx. 0.002g

Electrical Symbol:



Device Marking Code:



BENEFITS

- Ease in Driving Switches
- Low Offset(Error) Voltage
- Low-Voltage operation
- High-Speed Circuits
- Low Battery Voltage Operation

APPLICATIONS

- Drivers: Relays, Solenoids, Lamps, Hammers, displays, Memories
- Battery Operated Systems
- Power Supply Converter Circuits
- Load/Power Switching Cell Phones, agers

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

Static

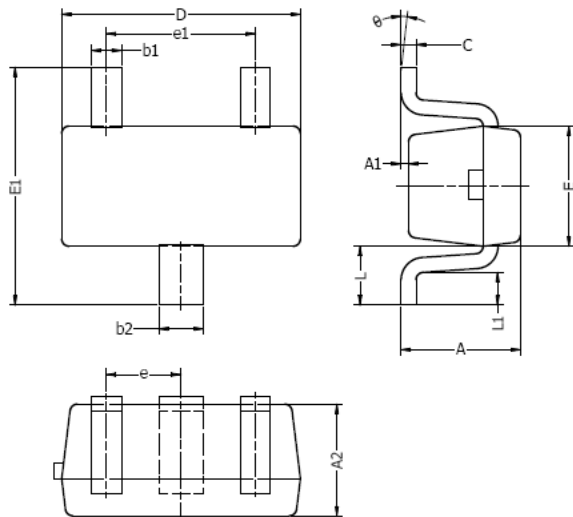
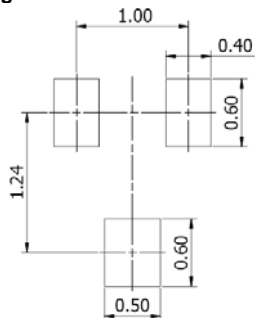
Symbol	Parameter	Test Condition	Limits			Unit
			Min	Typ	Max	
$V_{th(GS)}$	Gate-Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	0.45		0.9	Volts
I_{GSS}	Gate-Body Leakage	$V_{DS}=0\text{V}, V_{GS}=\pm 4.5\text{V}$		± 0.5	± 1.0	μA
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=20\text{V}, V_{GS}=0\text{V}$		0.3	100	nA
$I_{D(ON)}$	On-state Drain Current ^a	$V_{DS}=5\text{V}, V_{GS}=4.5\text{V}$	700			mA
$R_{DS(on)}$	Drain-Source On-Resistance ^a	$V_{GS}=4.5\text{V}, I_D=600\text{mA}$		0.41	0.70	Ω
		$V_{GS}=2.5\text{V}, I_D=500\text{mA}$		0.53	0.85	
		$V_{GS}=1.8\text{V}, I_D=350\text{mA}$		0.70	1.25	
g_{fs}	Forward Trans Conductance ^a	$V_{DS}=10\text{V}, I_D=400\text{mA}$		1		ms
V_{SD}	Diode Forward Voltage ^a	$I_S=150\text{mA}, V_{GS}=0\text{V}$		0.8	1.2	V

Dynamic ^b

Symbol	Parameter	Test Condition	Limits			Unit
			Min	Typ	Max	
Q_g	Total Gate Charge	$V_{DS}=10\text{V}, V_{GS}=4.5\text{V}, I_D=250\text{mA}$	--	750	--	pC
Q_{gs}	Gate-Source Charge		--	75	--	
Q_{gd}	Gate-Drain Charge		--	225	--	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=10\text{V}, R_L=47\Omega, I_D=200\text{mA}, V_{GEN}=4.5\text{V}, R_G=10\Omega$	--	5	--	ns
t_r	Rise Time		--	5	--	
$t_{d(off)}$	Turn-Off Delay Time		--	25	--	
t_f	Fall Time		--	11	--	

Notes:

- Pulse test: pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.

SOT-523 Package Outline

Typical Soldering Pattern:


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.70	0.90	0.028	0.035
A1	0.00	0.10	0.000	0.004
A2	0.70	0.80	0.028	0.031
b1	0.15	0.25	0.006	0.010
b2	0.25	0.35	0.010	0.014
c	0.10	0.20	0.004	0.008
D	1.50	1.70	0.059	0.067
E	0.70	0.90	0.028	0.035
E1	1.45	1.75	0.057	0.069
e	0.50 TYP.		0.020 TYP.	
e1	0.90	1.10	0.035	0.043
L	0.40 REF.		0.016 REF.	
L1	0.10	0.30	0.004	0.012
θ	0°	8°	0°	8°

NOTES:

1. Above package outline conforms to JEITA EAIJ ED-7500A SC-75A.
2. Dimensions are exclusive of Burrs, Mold Flash & Tie Bar extrusions.