

Descriptions

This 20A,60V N-Channel MOSFET in a TO-252 Plastic Package.

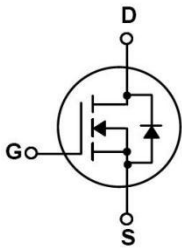
Features

- Low gate charge
- Low crss
- Fast switching
- HF Product

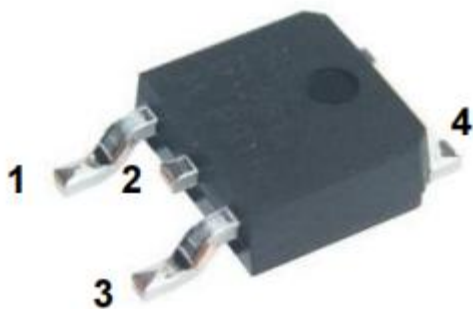
Applications

Suited for low voltage applications such as automotive, DC/DC Converters, and high efficiency switching for power management in portable and battery operated products.

Equivalent Circuit



Pinning



PIN1: Gate PIN 2: Drain PIN 3: Source PIN 4: Drain

Absolute Maximum Ratings(Ta=25°C)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DSS}	60	V
Drain Current	$I_D(T_C=25^\circ C)$	20	A
	$I_D(T_C=100^\circ C)$	20	A
Gate-Source Voltage	V_{GS}	±20	V
Power Dissipation	$P_D(T_C=25^\circ C)$	85	W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.7	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	100	°C/W

Electrical Characteristics(Ta=25°C)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V \quad I_D=250\mu A$	60			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=60V \quad V_{GS}=0V$			1	μA
		$V_{DS}=60V \quad T_C=150^\circ C$			250	μA
Gate-Body Leakage Current Forward	I_{GSS}	$V_{GS}=\pm 20V \quad V_{DS}=0V$			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS} \quad I_D=250\mu A$	1.0		3.0	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V \quad I_D=6A$		0.025	0.037	Ω
		$V_{GS}=4.5V \quad I_D=4A$		0.030	0.042	Ω
Input Capacitance	C_{iss}	$V_{DS}=25V \quad V_{GS}=0V$ $f=1.0MHz$		1060		pF
Output Capacitance	C_{oss}			315		pF
Reverse Transfer Capacitance	C_{rss}			65		pF
Turn-On Time	t_{ON}	$V_{DD}=30V \quad I_D=20A$ $R_{GS}=10\Omega \quad V_{GS}=4.5V$			240	ns
Turn-On Delay Time	$t_{d(on)}$			12		ns
Turn-On Rise Time	t_r			145		ns
Turn-Off Delay Time	$t_{d(off)}$			27		ns
Turn-Off Fall Time	t_f			50		ns
Turn-Off Time	t_{off}					120

Electrical Characteristics(Ta=25°C)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Turn-On Time	t _{ON}	V _{DD} =30V I _D =20A R _{GS} =10Ω V _{GS} =10V				65	ns
Turn-On Delay Time	t _{d(on)}				7		ns
Turn-On Rise Time	t _r				35		ns
Turn-Off Delay Time	t _{d(off)}				52		ns
Turn-Off Fall Time	t _f				50		ns
Turn-Off Time	t _{off}					155	ns
Total Gate Charge	Q _{g(TOT)}	V _{GS} = 0V to 10V	V _{DD} = 30V I _D = 20A I _{g(REF)} =1.0mA		28	34	nC
Gate Charge at 5V	Q _{g(5)}	V _{GS} = 0V to 5V			16	20	nC
Threshold Gate Charge	Q _{g(TH)}	V _{GS} = 0V to 1V			1.2	1.5	nC
Gate to Source Gate Charge	Q _{gs}				3.5		nC
Gate to Drain "Miller" Charge	Q _{gd}				7		nC
Source to Drain Diode Voltage	V _{SD}	I _{SD} = 20A				1.25	V
Reverse Recovery Time	t _{rr}	I _{SD} = 20A, dI _{SD} /dt = 100A/μs				90	ns
Reverse Recovered Charge	Q _{RR}	I _{SD} = 20A, dI _{SD} /dt = 100A/μs				225	nC

Electrical Characteristic Curve

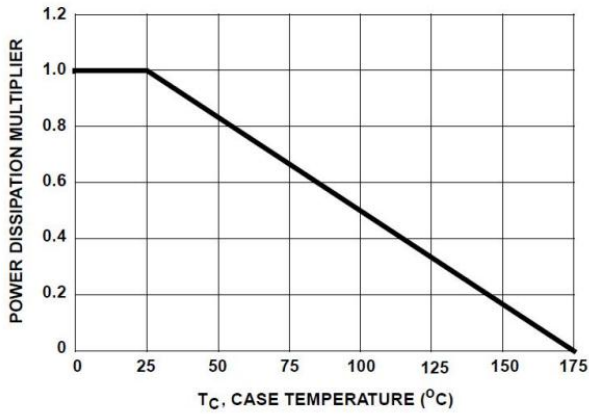


FIGURE 1. NORMALIZED POWER DISSIPATION vs CASE TEMPERATURE

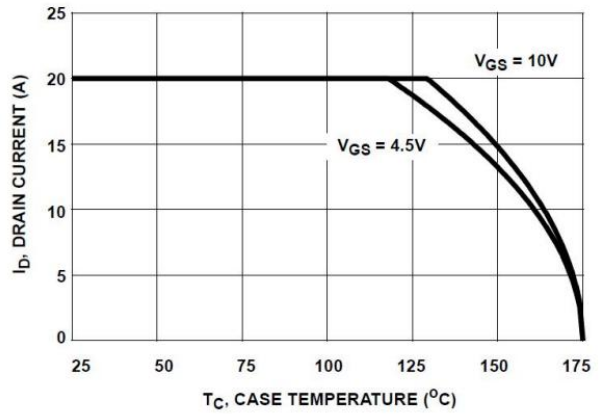


FIGURE 2. MAXIMUM CONTINUOUS DRAIN CURRENT vs CASE TEMPERATURE

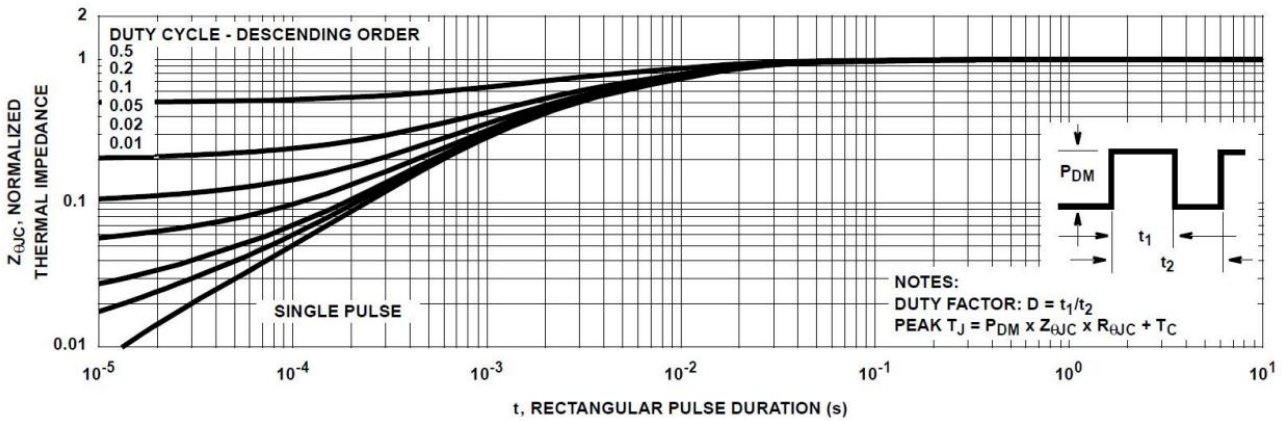


FIGURE 3. NORMALIZED MAXIMUM TRANSIENT THERMAL IMPEDANCE

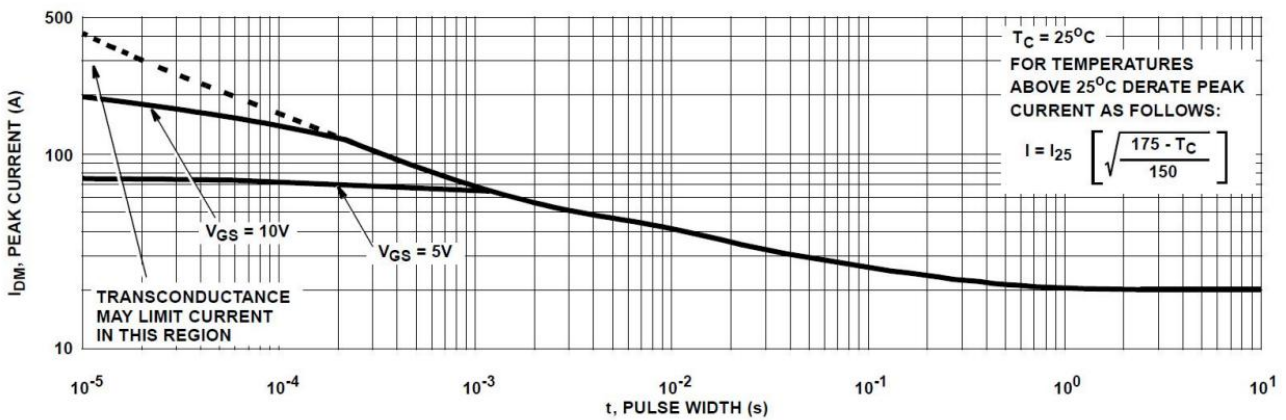


FIGURE 4. PEAK CURRENT CAPABILITY

Electrical Characteristic Curve

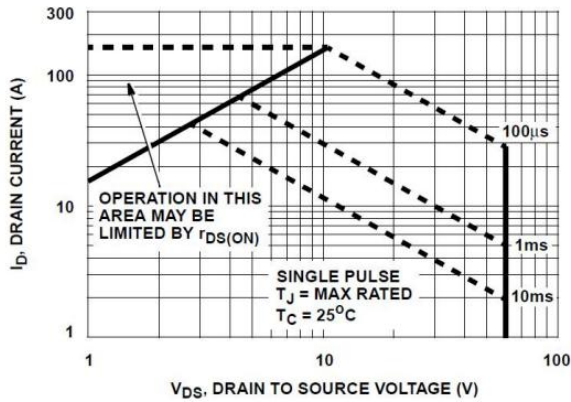
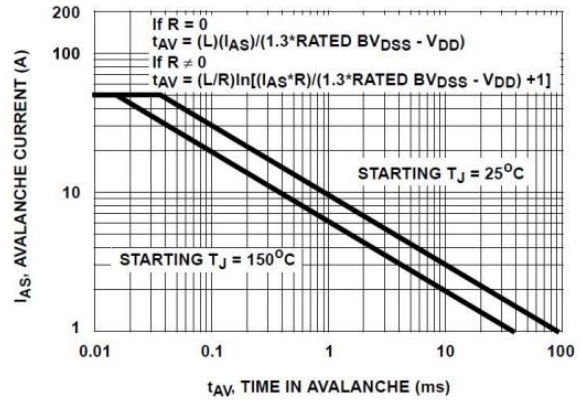


FIGURE 5. FORWARD BIAS SAFE OPERATING AREA



NOTE: Refer to Fairchild Application Notes AN9321 and AN9322.

FIGURE 6. UNCLAMPED INDUCTIVE SWITCHING CAPABILITY

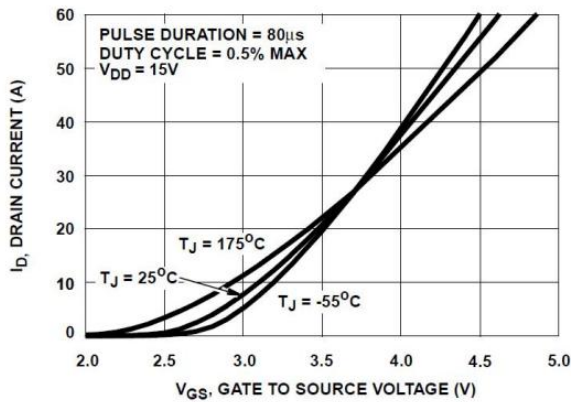


FIGURE 7. TRANSFER CHARACTERISTICS

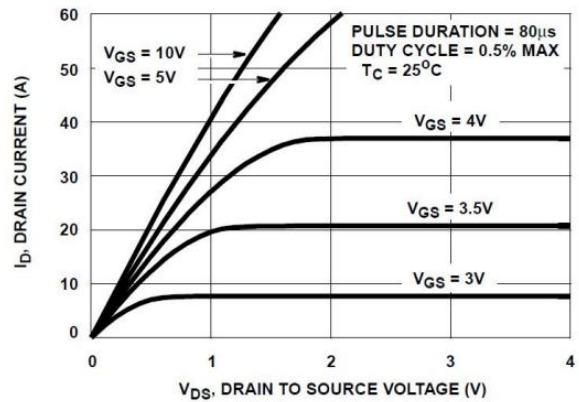


FIGURE 8. SATURATION CHARACTERISTICS

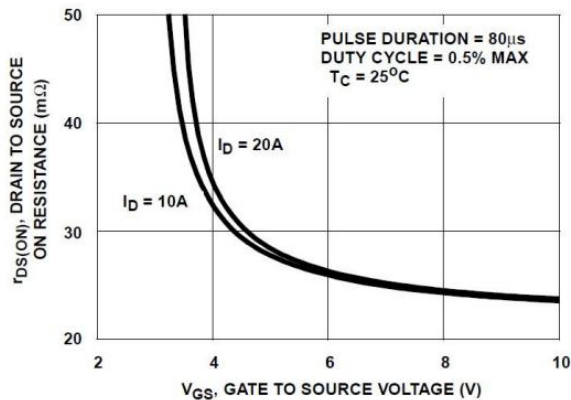


FIGURE 9. DRAIN TO SOURCE ON RESISTANCE vs GATE VOLTAGE AND DRAIN CURRENT

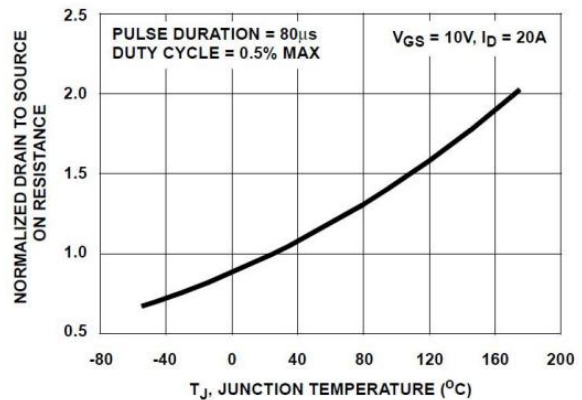


FIGURE 10. NORMALIZED DRAIN TO SOURCE ON RESISTANCE vs JUNCTION TEMPERATURE

Electrical Characteristic Curve

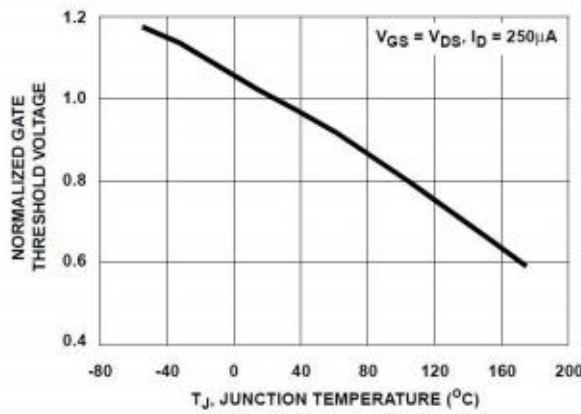


FIGURE 11. NORMALIZED GATE THRESHOLD VOLTAGE vs JUNCTION TEMPERATURE

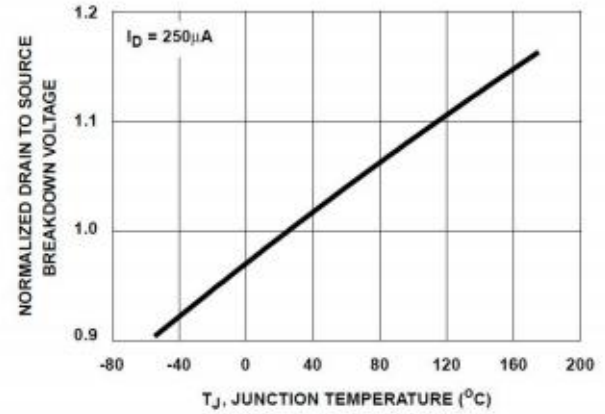


FIGURE 12. NORMALIZED DRAIN TO SOURCE BREAKDOWN VOLTAGE vs JUNCTION TEMPERATURE

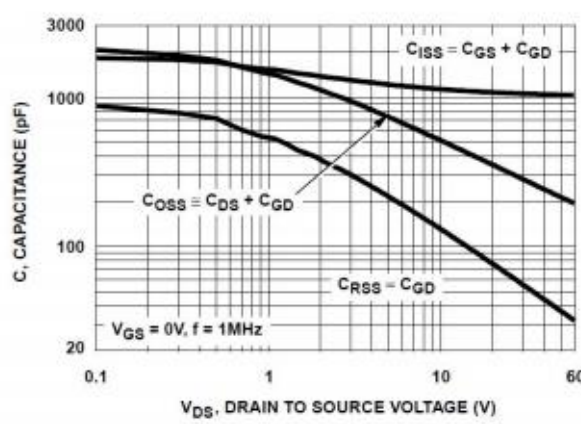
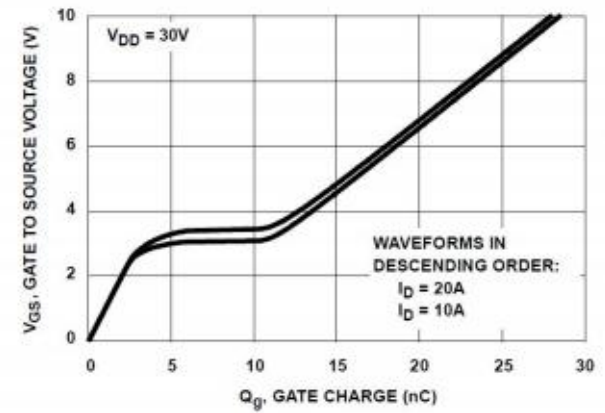


FIGURE 13. CAPACITANCE vs DRAIN TO SOURCE VOLTAGE



NOTE: Refer to Fairchild Application Notes AN7254 and AN7260.

FIGURE 14. GATE CHARGE WAVEFORMS FOR CONSTANT GATE CURRENT

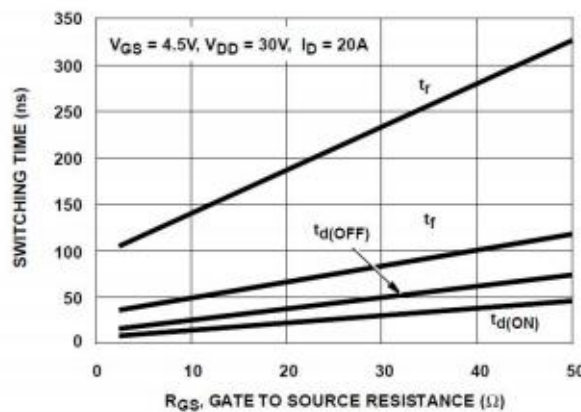


FIGURE 15. SWITCHING TIME vs GATE RESISTANCE

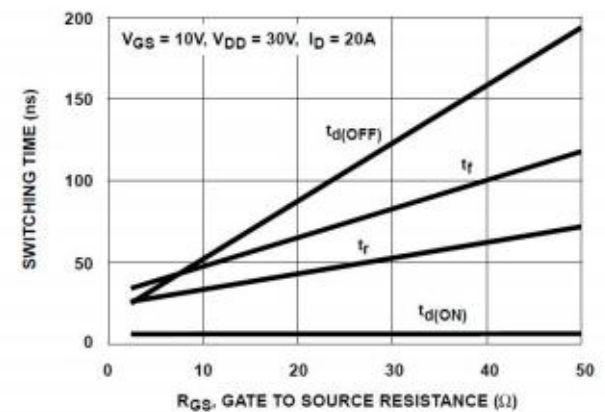


FIGURE 16. SWITCHING TIME vs GATE RESISTANCE

Test circuits & Typical Application

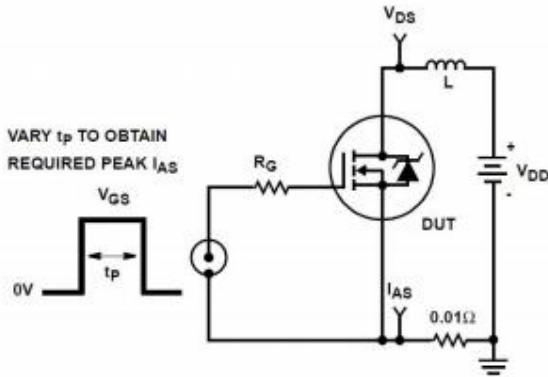


FIGURE 17. UNCLAMPED ENERGY TEST CIRCUIT

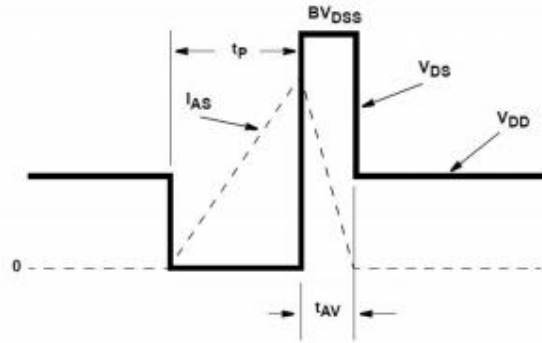


FIGURE 18. UNCLAMPED ENERGY WAVEFORMS

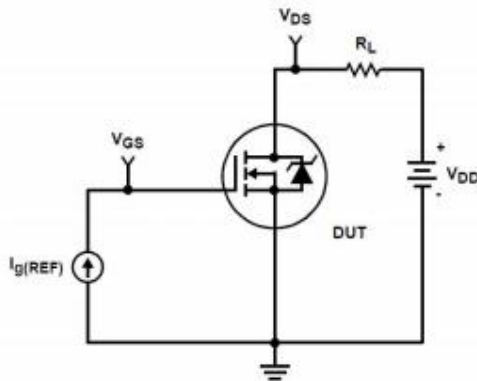


FIGURE 19. GATE CHARGE TEST CIRCUIT

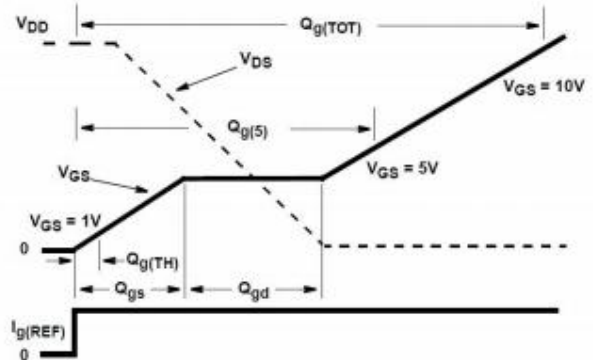


FIGURE 20. GATE CHARGE WAVEFORMS

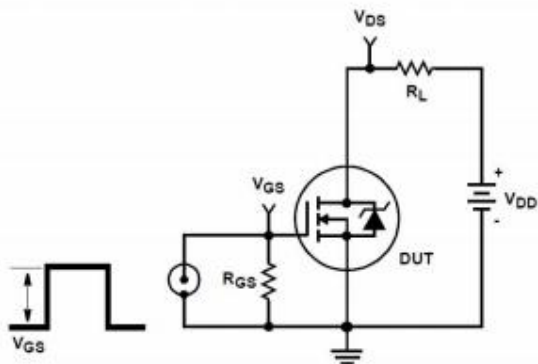


FIGURE 21. SWITCHING TIME TEST CIRCUIT

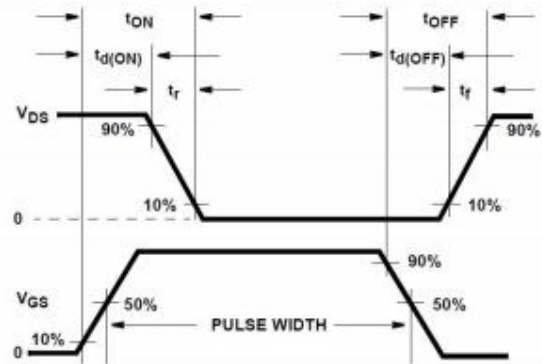
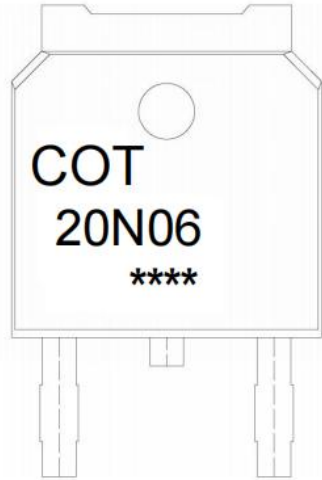


FIGURE 22. SWITCHING TIME WAVEFORM

Marking Instructions



Note:

COT: Company Code.

20N06: Product Type.

****: Lot No. Code, code change with Lot No.

Packaging SPEC

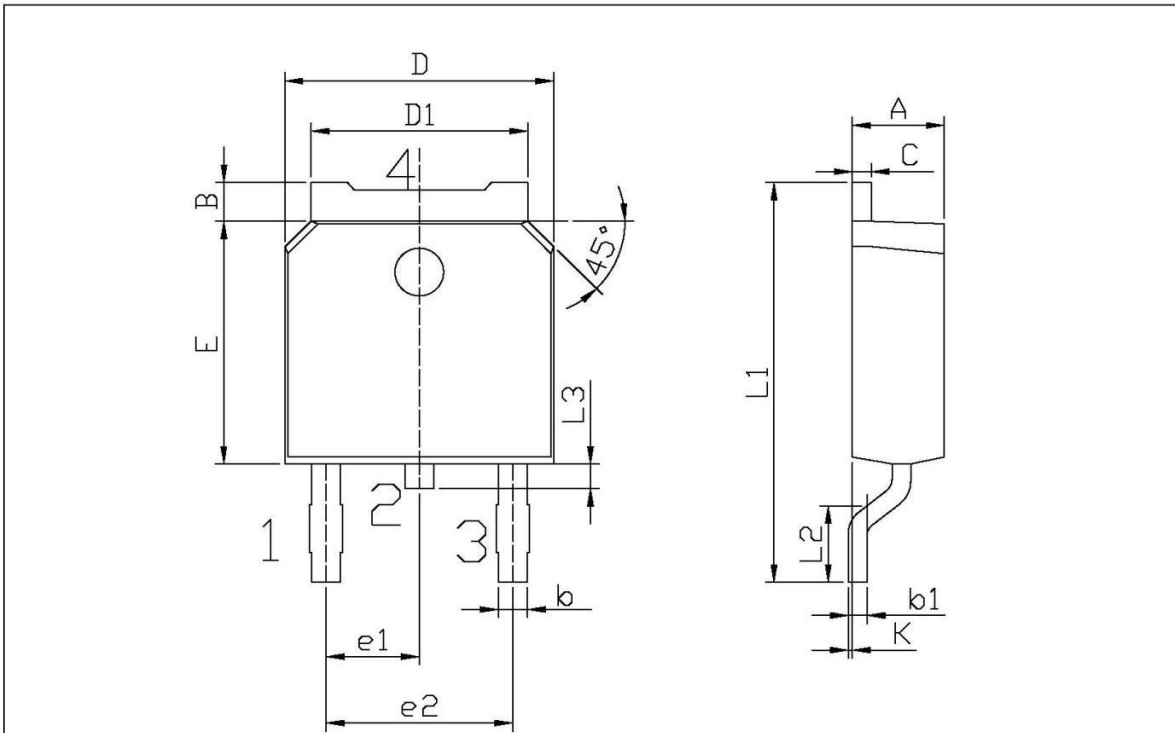
REEL INFORMATION

Package Type	Units					Dimension (unit: mm ³)		
	Units/Reel	Reels/Inner Box	Units/Inner Box	Inner Boxes/Outer Box	Units/Outer Box	Reel	Inner Box	Outer Box
TO-252	2,500	2	5,000	6	30,000	13" x16	360×360×50	380×335×366

TUBE INFORMATION

Package Type	Units					Dimension (unit: mm ³)		
	Units/Tube	Tubes/Inner Box	Units/Inner Box	Inner Boxes/Outer Box	Units/Outer Box	Tube	Inner Box	Outer Box
TO-252	75	48	3,600	5	18,000	526×20.5×5.25	555×164×50	575×290×180

Package Outline Dimensions



单位: mm

Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	2.20	2.40	E	5.95	6.25
B	0.95	1.25	e1	2.24	2.34
b	0.70	0.90	e2	4.43	4.73
b1	0.45	0.55	L1	9.85	10.35
C	0.45	0.55	L2	1.70	2.00
D	6.45	6.75	L3	0.60	0.90
D1	5.10	5.50	K	0.00	0.10

TO-252